A Stereo-Atlas of Ostracod Shells

edited by J. Athersuch, D. J. Horne, D. J. Siveter,
and J. E. Whittaker

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Contents

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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by only one page of text. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to one of the Editors. All contributions submitted for possible publication in the *Stereo-Atlas of Ostracod Shells* are reviewed by an appropriate international specialist.

The front cover shows a male left valve and appendages, internal view, of *Limnocythere borisi borisi* Martens, 1990. Paratype, K.B.I.N., Brussels, OC.1406. From Lake Abijata, Ethiopia. Photographed by K. Martens and J. Cillis.

595.336.16 (113.333) (47 : 161.022.58) : 551.351+552.54

ON *ORCOFABELLA TESTATA* (GAILITE)

by David J. Siveter & Lembit Sarv
(University of Leicester, England & Institute of Geology, Tallinn, Estonia)

Genus *ORCOFABELLA* Gailite, 1967
Type-species (by original designation): *Orcus testatus* Gailite, 1966.

1966 *Orcus* gen. nov. L. Gailite, *Palaeontology & Stratigraphy of the Baltic & Byelorussia,* Mintis, Vilnius, **1,** (6), 109.
1967 *Orcofabella* nom. nov. L. Gailite, *Geol. För. Stockh., Förh.*, **89,** 387 (*pro Orcus* Gailite, 1966, *non Orcus* Mulsant, 1850; *nec* Uljanin, 1870; *nec* Needham, 1897).

Diagnosis: Primitiopsacea with a curved, reticulate lateral valve surface and a prominent adductorial pit. Reticulation generally coarse, is delimited laterally by a weak ridge, typically contains elongate fossae dorsally adjacent to the adductorial pit. Velum occurs as a narrow, rounded ridge forming the valve margin in lateral view, continuous posteriorly as the dolon in females. Dolon normally open; can be ornamented with fine ridges.

Remarks: *Clavofabella* Martinsson, 1955, *Primitiopsis* Jones, 1887 and *Limbinariella* Sarv, 1968 are other Silurian reticulate primitiopsaceans. As represented by the type-species, *Orcofabella* differs from *Limbinariella* (see Siveter, D.J. & Sarv, L., *Stereo-Atlas Ostracod Shells,* **18,** 5–8, 1991) in having a curved valve surface, a more incurved and ornamented dolon and a different style of reticulation involving the occurrence of elongate fossae adjacent to a more discretely demarcated adductorial pit; the nature of the velum also differs between these genera. *Orcofabella* is distinguished from both *Primitiopsis* and *Clavofabella* by its typically coarser ornament, which is demarcated laterally by a more or less continuous ridge. Furthermore, the type-species of *Primitiopsis* has a closed dolon and a perimarginal ridge. Perimarginal structures have not yet been documented from *Orcofabella;* none are discernable in our material (Pl. **18**, 2, fig. 6).

Explanation of Plate 18, 2

Figs. 1–6, ♀ RV (**OS 5501**, 1050 μm long): fig. 1, ant.; fig. 2, ext. lat.; fig. 3, post.; fig. 4, vent. obl.; fig. 5, vent.; fig. 6, int. lat.
Scale A (200 μm; × 48), figs. 1–6.

Orcofabella testata (Gailite, 1966)

1966 *Orcus testatus* sp. nov. L. Gailite, *Palaeontology & Stratigraphy of the Baltic & Byelorussia,* Mintis, Vilnius, **1** (6), 110. pl. 2, figs. 1a–c.
1967 *Orcus testatus* Gailite; L. Gailite *in* L. Gailite *et al.*, *The Stratigraphy, fauna and conditions of formation of Silurian rocks in the central part of the Baltic region,* Zinatne, Riga, 104, pl. 3, figs. 5a–e.
1967 *Orcofabella testata* nom. nov.; L. Gailite, *Geol För. Stockh. Förh.*, **89**, 387.
1968 *Orcofabella testata* (Gailite); L. Sarv, *Ostracode families Craspedobolbiniidae, Beyrichiidae and Primitiopsidae in the Silurian of Estonia,* Valgus, Tallinn, 76, pl. 26, figs. 1–4.

Holotype: Formerly in the All-Union Marine Scientific Producing Enterprise "Sojuzmorinzhgeologia", Riga and is now in the Nature Museum, Riga, Latvia, no. **Os 31/121;** ♀ carapace.

Type locality: At 419m depth in the Piltene 1 borehole, W Latvia, Jura Formation; = Ohesaare regional 'stage', Přídolí Series, Silurian.

Diagnosis: *Orcofabella* species with lateral reticulation coarse overall, contains several obliquely elongate fossae above the adductorial pit, shows a few areas of sparsely developed second order reticulation. External surface of dolon has anastomising ridges.

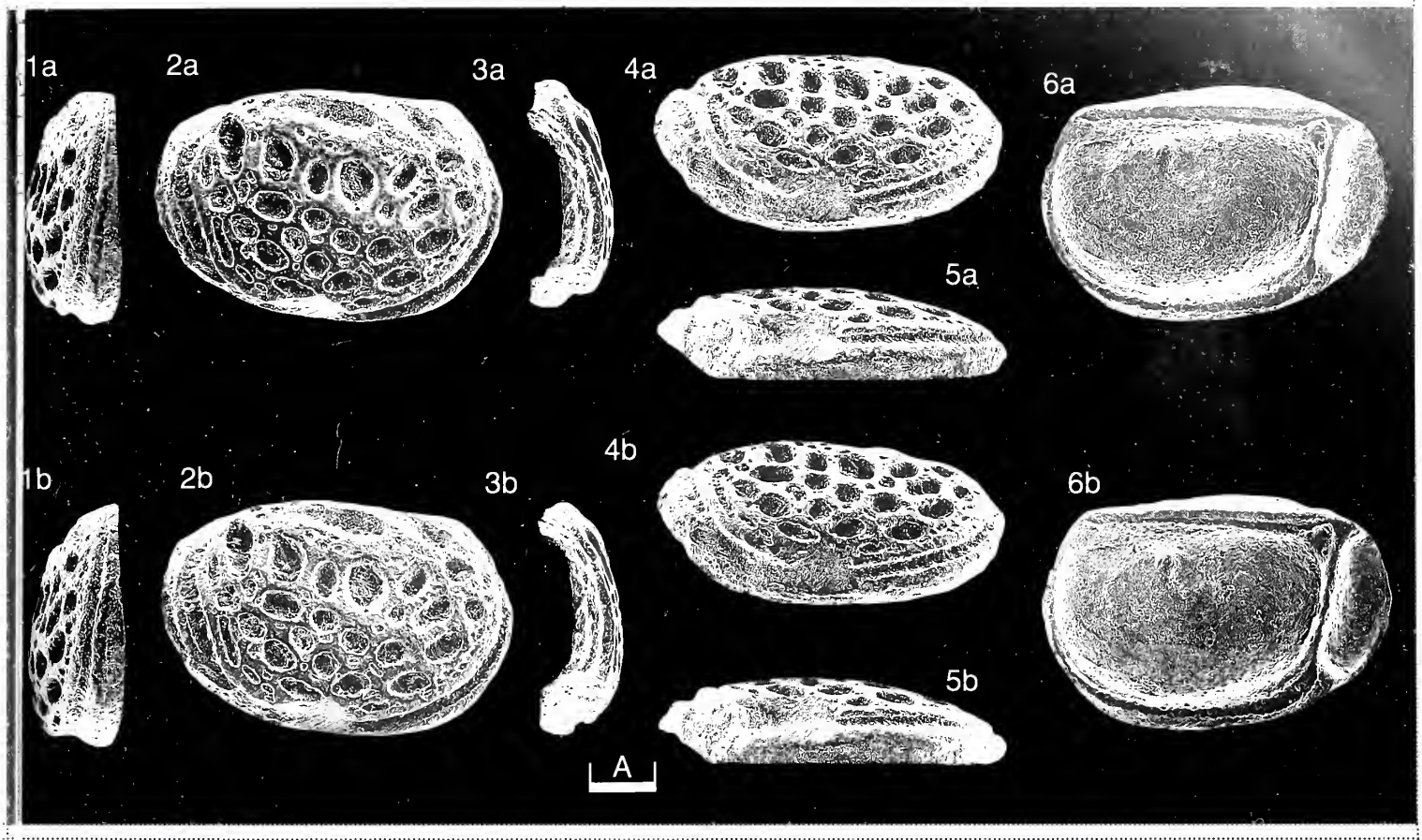
Figured specimens: Institute of Geology, Tallinn, Estonia, nos. **Os 5501** (♀ RV: Pl. **18**, 2, figs. 1–6), **Os 5502** (♀ RV: P1. **18**, 4, figs. 1–3), **Os 5503** (tecnomorphic RV: Pl. **18,** 4, figs. 4–6). All originals of Sarv, 1968 (pl. 26, figs. 1–4; from cliff section near Ohesaare, Saaremaa Island, Estonia (lat. 58°12′N, long. 22°30′E); Ohesaare (K_4) regional 'stage', Přídolí Series, Silurian.

Remarks: Of the described *Orcofabella* species *O. levireticulata* Schallreuter (*Mitt. geol.-paläont. Inst. Univ. Hamburg*, **61**, 1986) is known from erratics (Přídolí age) in Germany and *O. arguta* Gailite, 1966, *O. araneosa* (Gailite, 1966), *O. obscura* Sarv, 1968 and the type-species are recorded almost exclusively from the East Baltic. *O. arguta* is closest to *O. testata* but differs most obviously in ornament. *Orcofabella* also probably occurs in Podolia, USSR (A.F. Abushik, unpublished).

Distribution: Silurian. East Baltic. Overall stratigraphic range: Kaugatuma (K_{3b}) and Ohesaare (K_4) regional 'stages' Přídolí Series. Saaremaa Island, Estonia: cliff near Ohesaare (Sarv, 1968). Latvia: Piltene 1 (Gailite, 1967) and Piltene 31 and Kolka 4 boreholes (Gailite, L. *in*: *Phanerozoic Stratigraphy of the East Baltic*, Zinatne, Riga, 1978). Lithuania: boreholes no. 89 and 112 (Sidaraviciene, N. *in*: Kaljo, D. & Klaaman, E. (eds.), *Theory & Practice of Ecostratigraphy*, Valgus, Tallinn, 1986).

Explanation of Plate 18, 4

Figs. 1–3, ♀ RV (**Os 5502,** 1100 μm long): fig. 1, ant; fig. 2, ext. lat.; fig. 3, vent. Figs. 4–6, tecnomorphic RV (**Os 5503**, 880 μm long): fig. 4, vent.: fig. 5, ext. lat.; fig. 6, post. Scale A (200 μm; × 46), figs. 1–3; scale B (200 μm; × 56), figs. 4–6.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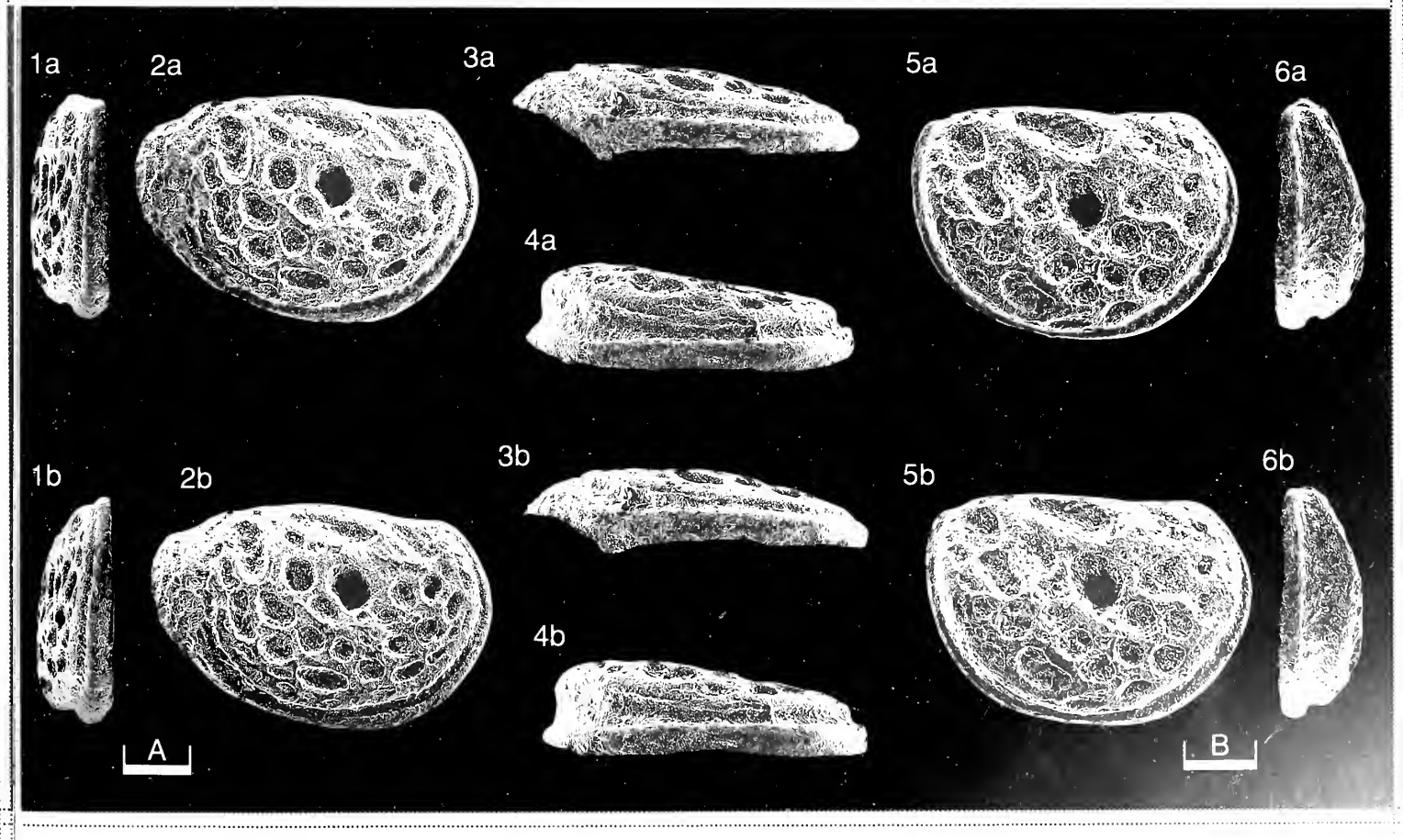
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595.336.16 (113.333) (47 : 161.022.58) : 551.351+552.54

ON *LIMBINARIELLA MACRORETICULATA* SARV

by David J. Siveter & Lembit Sarv
(University of Leicester, England & Institute of Geology, Tallinn, Estonia)

Genus *LIMBINARIELLA* Sarv, 1968
Type-species (by original designation): *Limbinariella macroreticulata* Sarv, 1968.

Diagnosis: Coarsely reticulate Primitiopsacea. Valve lateral surfaces flat, bounded by a narrow ridge. Adductorial sulcus large, distinct, pit-like, connecting dorsally with a large fossa in the reticulation. Posterior dolon with open antrum. In female right valves velar ridge occurs ventrally and is confluent posteroventrally with the dolon; velum absent in tecnomorphs and ventrally in female left valves.

Remarks: The left/right valve variation in the development of the velum of *Limbinariella* (see 'Diagnosis') has been confirmed in topotype material of both Estonian members of the genus, the type-species and *L. malornata* Sarv, 1968. A presence/absence of the (non-dolonal part of the) velum between right and left valves is a feature also known from another Baltic primitiopsacean, *Venzavella costata* (Neckaja, 1960) (see Siveter, D. J. & Sarv, L, *Stereo-Atlas Ostracod Shells*, **18**, 9–12, 1991), but in that type-species the phenonemon characterises both males and females. The dolonal morphology and flat valve surface bordered by a ridge is also common to both genera; thus, in many essential respects they are similar and may be more closely related than previously supposed.

Limbinariella differs from *Venzavella* in ornament and morphology of the adductorial sulcus. *Limbinariella* differs from *Limbinaria* Swartz (*in* Swartz, F. M. & Whitmore, F. C., *J. Paleont.*, **30**, 1054, 1956), from the Silurian of the U.S.A., in valve profile and dolonal morphology.

Preparation of the antral region of the material of *L. macroreticulata* is extremely difficult. So far no perimarginal structures have been observed.

Explanation of Plate 18, 6

Figs. 1, 2, ♀ RV (**OS 13705**, 700 μm long): fig. 1, ext. lat.; fig. 2, vent. Figs. 3–5, ♂ RV (**OS 13708**, 625 μm long): fig. 3, ext. lat.; fig. 4, vent.; fig. 5, post. Figs. 6–8, ♀ LV (**OS 13706**, 700 μm long): fig. 6, post.; fig. 7, ext. lat.; fig. 8. vent.
Scale A (200 μm; ×67), figs. 1, 2, 6–8; scale B (200 μm; ×73), figs. 3–5.

Limbinariella macroreticulata Sarv, 1968

1968 *Limbinariella macroreticulata* gen. et sp. nov. L. Sarv, *Ostracode families Craspedobolbinidae, Beyrichiidae and Primitiopsidae in the Silurian of Estonia*, Valgus, Tallinn, 71, pl. 15, figs. 1–4.

Holotype: Institute of Geology, Academy of Sciences, Tallinn, Estonia, no. **OS 5541**; ♀ left valve.

Type locality: Unimäe, 6 km N of Kuressaare (formerly known as Kingissepp), Saaremaa Island, Estonia. Paadla regional 'stage' (K_2), Ludlow Series, Silurian.

Figured specimens: British Museum (Nat. Hist.), nos. **OS 13705** (♀ RV: Pl. **18**, 6, figs. 1, 2), **OS 13708** (♂ RV: Pl. **18**, 6, figs. 3–5), **OS 13706** (♀ LV: Pl. **18**, 6, figs. 6–8), **OS 13709** (♀ RV: Pl. **18**, 8, figs. 1–3), **OS 13707** (♂ LV: Pl. **18**, 8, figs. 4–6), **OS 13710** (tecnomorphic LV: Pl. **18**, 8, figs. 7, 8). All topotype (approximately lat. 58°12′N; long. 22°30′E); collected Sarv, 1959.

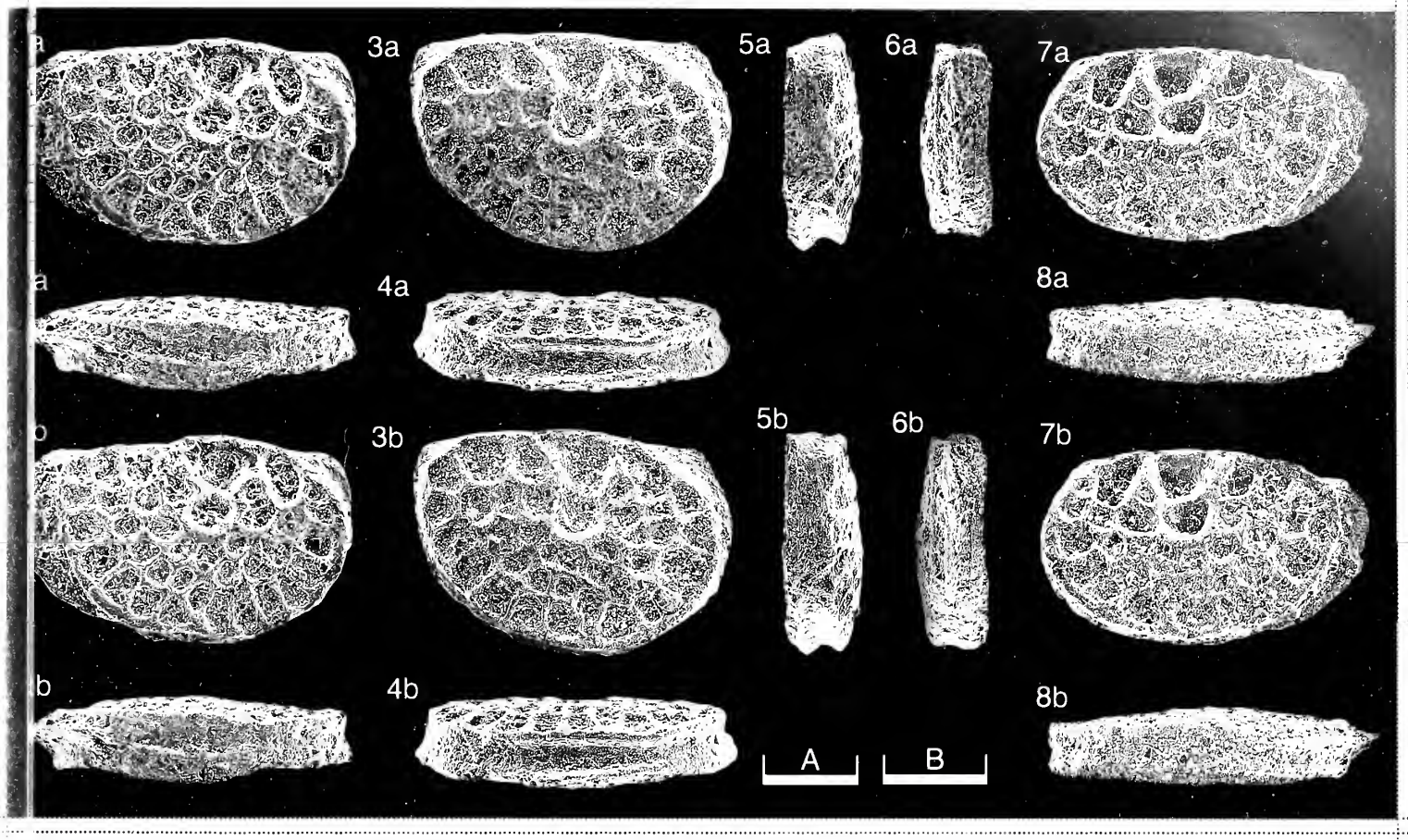
Remarks: *L. macroreticulata* differs from the upper Ludlow *L. malornata* mainly by its coarser ornament. *Limbinariella semiplicata* Schallreuter (*Mitt. geol.-paläont. Inst. Univ. Hamburg*, **61**, 204, 1986), from erratic boulders (Přídolí Series, Isle of Sylt, Germany), differs in valve shape and in the size of its dolon and adductorial sulcus.

Limbinariella cf. *macroreticulata* has been recorded from the Isakovsky beds of Podolia, USSR, which are correlatives of the Kuressaare regional 'stage' of Estonia (Abushik, A. F. *et al.*, *Lethaia*, **18**, 139, 143, 1985; Koren, T. N. *et al.*, *in* Holland, C. H. & Bassett, M. G., A global standard for the Silurian System, *Nat. Mus. Wales Geol. Ser.* no. **9**, Cardiff, 1989).

Distribution: Silurian. East Baltic and possibly Podolia, USSR. Overall stratigraphic range: uppermost part of Paadla (K_2) and Kuressaare (K_{3a}) regional 'stages', Ludlow Series. Saaremaa Island, Estonia: the type locality (Unimäe) and locality Kuressaare (Sarv, 1968); and the Kaugatuma (unpublished information) and Ohesaare boreholes (Sarv, 1968 and *Eesti NSV Tead. Akad. Toim.*, (Keemia, Geol.), **20**, 1971). Latvia: Kolka 54 borehole (Sarv, L. *in*: Kaljo, D. (Ed.), *Facies & Fauna of the Baltic Silurian*, Acad. Sci. Estonian S.S.R. Tallinn, 1977). Lithuania: Virbalis and Kunkojai boreholes (Sarv, 1977).

Explanation of Plate 18, 8

Figs. 1–3, ♀ RV (**OS 13709**, 700 μm long): fig. 1, ext. lat.; fig. 2, vent.; fig. 3, obl. vent. Figs 4–6, ♂ LV (**OS 13707**, 680 μm long): fig. 4, obl. vent.; fig. 5, ext. lat.; fig. 6, vent. Figs. 7, 8, tecnomorphic LV (**OS 13710**, 580 μm long): fig. 7, ext. lat.; fig. 8, vent.
Scale A (200 μm; ×65), figs. 1–6; scale B (100 μm; ×70), figs. 7, 8.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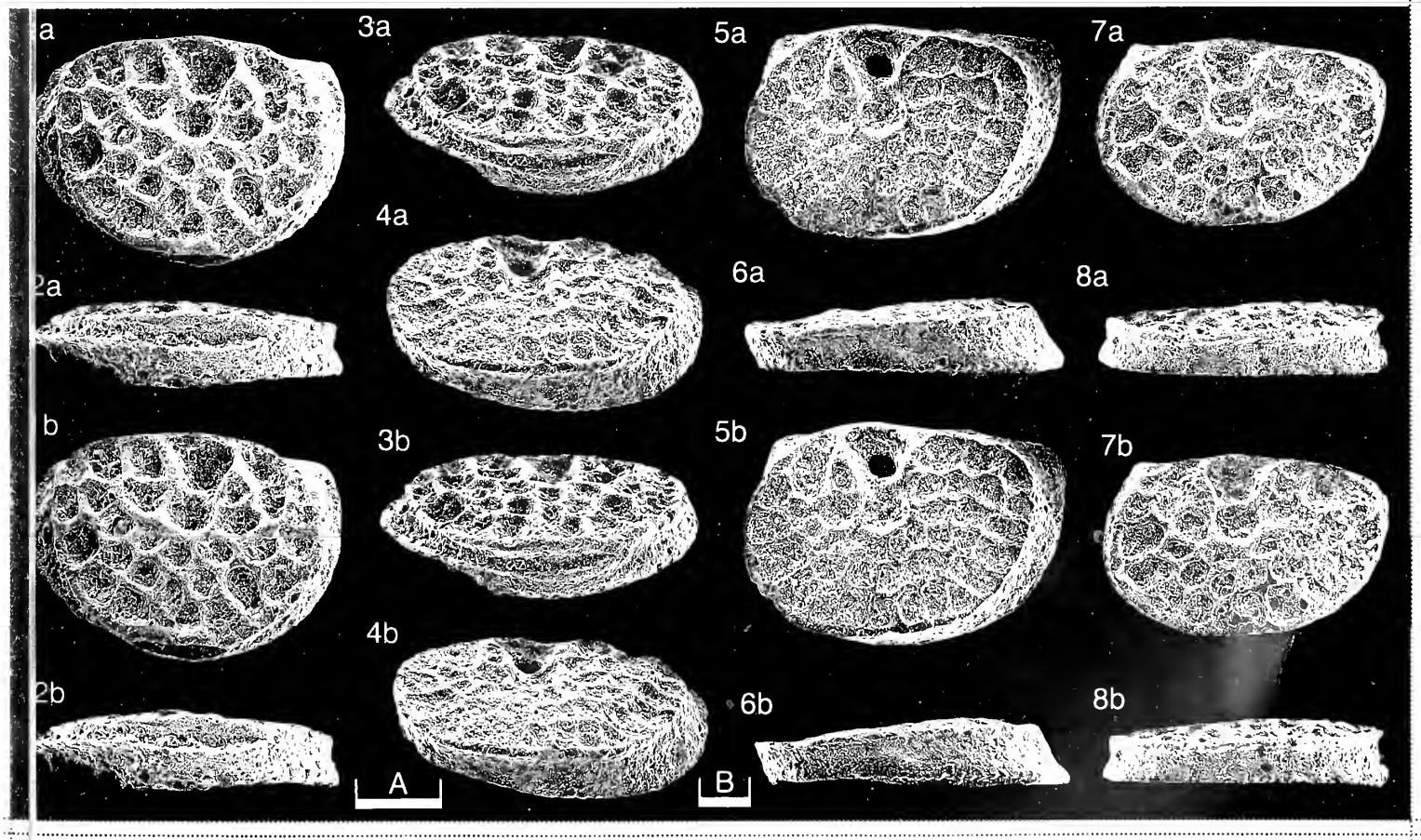
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595.336.16 (113.333) (47 : 161.022.58) : 551.351+552.54

ON *VENZAVELLA COSTATA* (NECKAJA)

by David J. Siveter & Lembit Sarv
(University of Leicester, England & Institute of Geology, Tallinn, Estonia)

Genus *VENZAVELLA* Gailite, 1967

Type-species (by original designation): *Limbinaria costata* Neckaja, 1960

Diagnosis: Primitiopsacea with a velar ridge in females and tecnomorphs. Females have posterior dolon with open antrum. Rounded adductorial pit. Ornament: 2–20 oblique ridges (striae). Perimarginal structure (ridge) present. Right valve larger.

Remarks: A perimarginal ridge is known only in the type-species. *Venzavella* differs from *Limbinariella* Sarv, 1968 (see Siveter D. J. & Sarv, L., *Stereo-Atlas Ostracod Shells*, **18**, 5–8, 1991) chiefly in ornament and morphology of the adductorial sulcus. The general nature of the adventral structures and dimorphism is essentially similar in both genera.

Five *Venzavella* species are known, principally from East Baltic sequences. *Venzavella* also occurs in Baltic erratics. (Schallreuter, R. E. L., *Mitt. geol.-paläont. Inst. Univ. Hamburg*, **61**, 1986). *V. germana* Sarv, 1968 (lower Wenlock Jaani regional 'stage', Estonia) is the oldest species. *V. multicostata* (Neckaja, 1960) [= *V. loriei* (Bonnena, 1910), see Schallreuter, 1986], *V. subcostata* Gailite, 1967 and the type-species are all from the Přídolí Series (Kaugatuma and Ohesaare regional 'stages'). *V. dicostata* (Gailite) (*Palaeontology & Stratigraphy of the Baltic and Byelorussia*, Mintis, Vilnius, **1** (6), 1966) is known only from the Ohesaare level.

Venzavella costata (Neckaja, 1960)

1960 *Limbinaria costata* Neckaja sp. nov. A. I. Neckaja, *in*: *Novye vidy drevnikh rastenii i bespozvonochnykh*, Moscow, 2, 316, pl. 61, figs. 7, 8.

1967 *Venzavella costata* (Neckaja); L. Gailite, *in*: L. Gailite *et al.*, *The Stratigraphy, fauna and conditions of formation of Silurian rocks in the central part of the Baltic Region*, Zinatne, Riga, 102, pl. 2, figs. 6a, b.

Explanation of Plate 18, 10

Figs. 1–4, 6, ♀ LV (**OS 13702,** 1000 μm long): fig. 1, post.; fig. 2, ext. lat.; fig. 3, vent.; fig. 4, int. lat.; fig. 6, posterolat. obl. Fig. 5, RV ext. lat. (holotype, **60/157,** 980 μm long). Fig. 7, ♀ RV, ext. lat. (**Os 5562,** 1010 μm long).
Scale A (200 μm; ×50), figs. 1–5, 7; scale B (200 μm; ×70), fig. 6.

1968 *Venzavella costata* (Neckaja); L. Sarv, *Ostracode families Craspedobolbinidae, Beyrichiidae and Primitiopsidae in the Silurian of Estonia*, Valgus, Tallinn, 78, pl. 28, figs. 3–14.

Holotype: All-Union Petroleum Scientific Research Geological Institute (VNIGRI), Lenningrad, no. **60/157;** ♂ right valve.

Type locality: Cliff near Kaugatuma, Saaremaa, Estonia; Kaugatuma regional 'stage' (K_{3b}), Přídolí Series, Silurian.

Diagnosis: Species of *Venzavella* with 6–7 main ridges on each valve. Females have perimarginal ridge and relatively wide dolon. Lobate area bounded by fine ridge weakly bipartite above hinge line. Velar ridge along ventral part of valve in right valve of tecnomorphs and females, is typically absent in left valves.

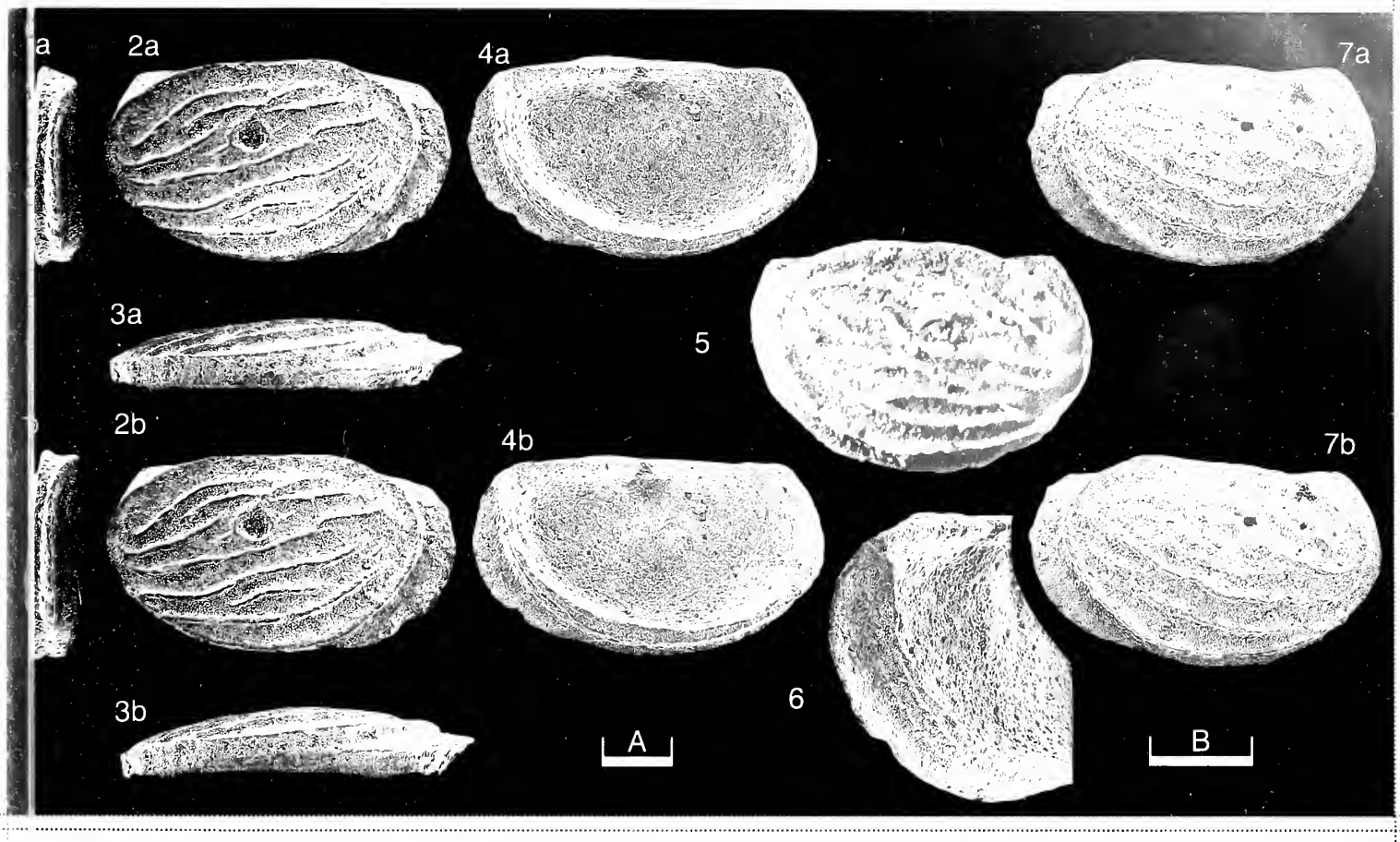
Figured specimens: Institute of Geology, Estonian Academy of Sciences, Tallinn, nos. **Os 5562** (♀ RV: Pl. **18,** 10, fig. 7), **Os 5563** (♀ car.: Pl. **18,** 12, figs. 3, 4), **Os 5569** (♂ car.: Pl. **18,** 12, figs. 1, 2); originals Sarv, 1968. VNIGRI, Lenningrad, no. **60/157** (holotype, ♂ RV: Pl. **18**, 10, fig. 5). British Museum (Nat. Hist.), nos. **OS 13702** (♀ LV: Pl. **18,** 10, figs. 1–4, 6), **OS 13703** (♀ RV: Pl. **18,** 12, fig. 6), **OS 13704** (tecnomorphic car.: Pl. **18,** 12, fig. 5). All topotypes; approximately lat. 58°12′N, long. 22°30′E.

Remarks: The perimarginal ridge in females has only been seen with certainty in left valves (Pl. **18,** 10, figs. 4, 6). The (ventral) velar ridge is normally found only in the right valve (Pl. **18,** 12, figs. 2, 3); however, sometimes it appears also to be (relatively weakly) developed in left valves. *V. costata* differs from *V. germana* chiefly in having a much wider dolon. *V. costata* is most easily distinguished from its congeneric, coeval species by its number of ornamental ridges.

Distribution: Silurian, East Baltic. Overall stratigraphic range: Kaugatuma (K_{3b}) and Ohesaare (K_4) regional 'stages', Přídolí Series. Saaremaa, Estonia: type locality and localitites Ohesaare, Äigu and Veneküla (Sarv, 1968) and the Kaugatuma borehole (unpublished information). Latvia: Piltene 1 (Gailite, 1967), Piltene 32 (Sarv, L. *in*: Kaljo, D. (ed.), *Facies & Fauna of the Baltic Silurian*, Acad. Sci. Estonian S. S. R., Tallinn, 1977) and Kolka 4 (Gailite, L. *in*: *Phanerozoic Stratigraphy of the East Baltic*, Zinatne, Riga, 1978) boreholes. Lithuania: Virbalis borehole (Gailite, 1967) and boreholes nos. 87, 89 and 98 (Sidaraviciene, N. *in*: Kaljo. D., & Klaaman, E. (eds.), *Theory & Practice of Ecostratigraphy*, Valgus, Tallinn, 1986).

Explanation of Plate 18, 12

Figs. 1, 2, ♂ car. (**Os 5569,** 970 μm long): fig. 1, ext. lat.; fig. 2, vent. Figs. 3, 4, ♀ car. (**Os 5563,** 960 μm long); fig. 3, vent.; fig. 4, post. Fig. 5, tecnormorphic car., ext. lat. (**OS 13704,** 900 μm long). Fig. 6, ♀ RV, ext. lat. (**OS 13703,** 1050 μm long).
Scale A (200 μm; ×50), figs. 1–6.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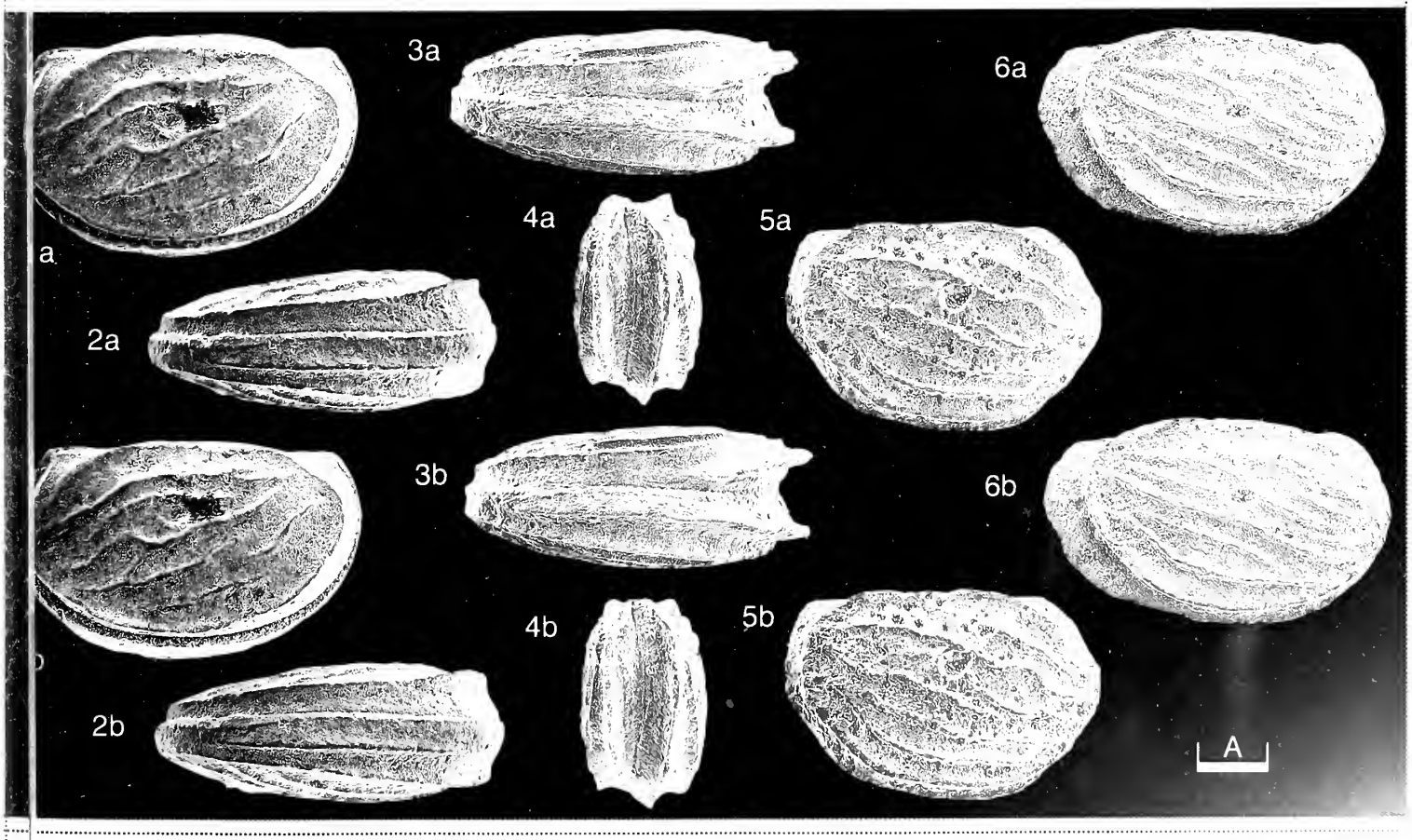
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ON *LOMATOPISTHIA SIMPLEX* (HARRIS)

by Mark Williams
(University of Leicester, England)

Genus *LOMATOPISTHIA* Guber & Jaanusson, 1964
Type-species (by original designation): *Thomasatia simplex* Harris, 1957.

Diagnosis: Small, quadrilobate Lomatopisthidae. Lobes confluent ventrally with connecting lobe. L1 and L4 reaching the dorsal margin. L3 a broad lobe not reaching the dorsal margin. L2 often as a discrete node. L4 continued posteriorly as a ridge, or overhanging the posterior margin. Lobate area bordered by extralobal area thickened into a marginal ridge. Well developed inner lamella. Heteromorphic carapace inflated posterior to S2. (Modified from Guber & Jaanusson, 1964).

Discussion: In their diagnosis for the new Family Lomatopisthidae (Superfamily and Suborder uncertain) and new genus *Lomatopisthia* Guber & Jaanusson (1964) did not refer to the presence of an inner lamella. This is present in all species they referred to *Lomatopisthia*, and also appears to be present in the lomatopisthid genus *Raymondatia* Kay, 1934, based on published photographs (Moore *et al.* 1961, *Treatise on Invertebrate Paleontology*, fig. 72.3e). Other new genera referred to the Lomatopisthidae by Guber & Jaanusson in 1964 include *Bolbopisthia*, *Dibolbopisthia*, and *Phyladopisthia*. These appear to lack an inner lamella. Schallreuter (1978) referred his new genus *Europisthia* to the Lomatopisthidae, but did not mention the presence of an inner lamella. The Family Lomatopisthidae may require revision based on the presence or absence of the inner lamella.

Explanation of Plate 18, 14

Fig. 1, ♂ LV, ext. lat. (paratype, **MCZ 4641b**, 0.60mm long). Figs 2, 5, ♂ RV (**OS 13500**, 0.56mm long); fig. 2, ext. lat.; fig. 5, int. lat. Fig. 3, ♂ RV, vent. (**OS 13497**, 0.51mm long). Fig. 4, ♂ LV, vent. (**OS 13499**, 0.56mm long).
Scale A (100μm; ×87), figs. 1, 2, 5; scale B (100μm; ×102), fig. 3; scale C (100μm; 95), fig. 4.

Lomatopisthia simplex (Harris, 1957)

1957 *Thomasatia simplex* n. sp., R. W. Harris, *Bull. Okla. geol. Surv.*, **75**, 245, pl. 8, figs. 15, 17a, b.
1964 *Lomatopisthia simplex* (Harris); A. L. Guber & V. Jaanusson, *Bull. geol. Instn Univ. Uppsala*, **43**, 27, pl. 3, figs. 5–15, text-fig. 12.
1982 *Lomatopisthia simplex* (Harris); M. J. Copeland, *Bull. geol. Surv. Can.*, **347**, 10, pl. 8, fig. 5.

Holotype: Museum of Comparative Zoology, Harvard University, U.S.A., no. **4641**; a tecnomorphic left valve.

Type locality: Decker's Bed 36 (see Harris, 1957), Bromide Formation, Simpson Group, Middle Ordovician; Highway 99 Section, Oklahoma, U.S.A.; approximate latitude 34°35′N, longitude 96°41′W.

Figured specimens: Museum of Comparative Zoology, Harvard University, nos. **4641** (holotype, ♀ LV: Pl. **18**, 16, figs. 1–3), **4641b** (paratype, ♂ LV: Pl. **18**, 14, fig. 1). British Museum (Nat. Hist.), London, nos. **OS 13500** (♂ RV: Pl. **18**, 14, figs. 2, 5), **OS 13497** (♂ LV: Pl. **18**, 14, fig. 3), **OS 13499** (♂ RV: Pl. **18**, 14, fig. 4), **OS 13498** (♀ RV: Pl. **18**, 16, fig. 4). Holotype and paratype specimens from the type locality and horizon. All other specimens from a single sample in the Mountain Lake Member of the Bromide Formation at the type locality. Sample provided by Mr. A. Grafham, Geological Enterprises, Ardmore, Oklahoma, U.S.A.

Diagnosis: *Lomatopisthia* species having rounded lobes with L3 especially broad. Tecnomorph with deep crescentic S3. Posterior part of heteromorph shows domiciliar inflation and much reduced S3, with L3 bordered by a distinct dorsal furrow.

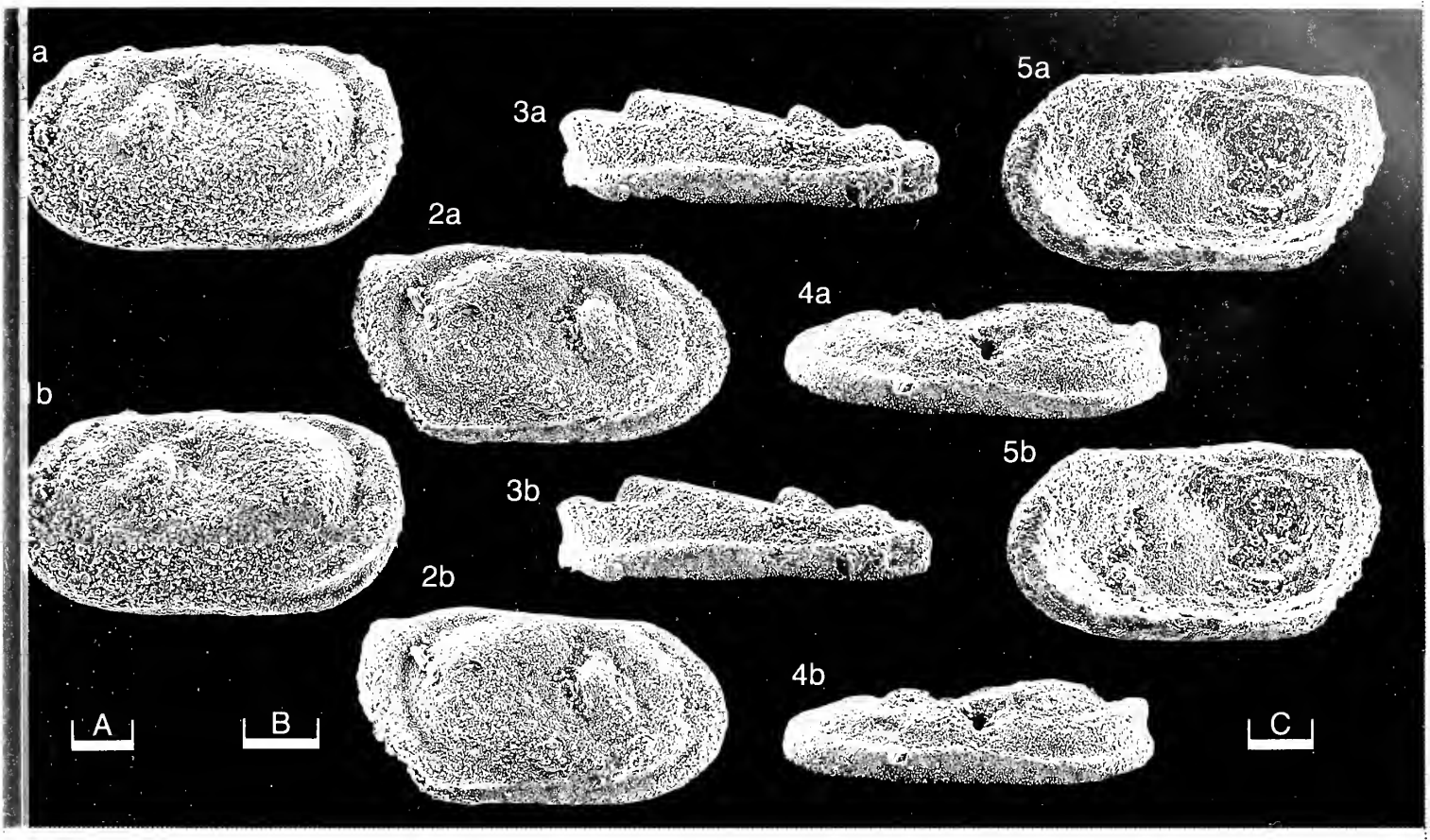
Discussion: *L. simplex* has the weakest lobation of all *Lomatopisthia* species except *L. varicata* (Harris, 1957). It is most similar to *L. rectantulata* (Kraft, 1962), differing only by lacking a furrow between L3 and the connecting lobe, and by having the anterior margin of L2 clearly separate from L1. *L. auricula* (Harris, 1957) has much stronger lobation (see Williams, M., *Stereo-Atlas Ostracod Shells*, **18**, 17–20, 1991).

Occurrence: A species occuring in open marine sediments. Found in the Middle Ordovician Tulip Creek and Bromide formations of Oklahoma, and the Middle Ordovician Day Point Formation of New York, U.S.A. (Copeland, 1982).

Acknowledgement: Dr David J. Siveter and Mr Matthew Wakefield (University of Leicester) for useful discussion.

Explanation of Plate 18, 16

Figs. 1–3, ♀ LV, (holotype, **MCZ 4641**, 0.54mm long). fig. 1, ext. lat.; fig. 2, ext. lat. obl.; fig. 3, vent. Fig. 4, ♀ RV, ext. lat. (**OS 13498**, 0.56mm long). Scale A (100μm; ×85), figs. 1–4.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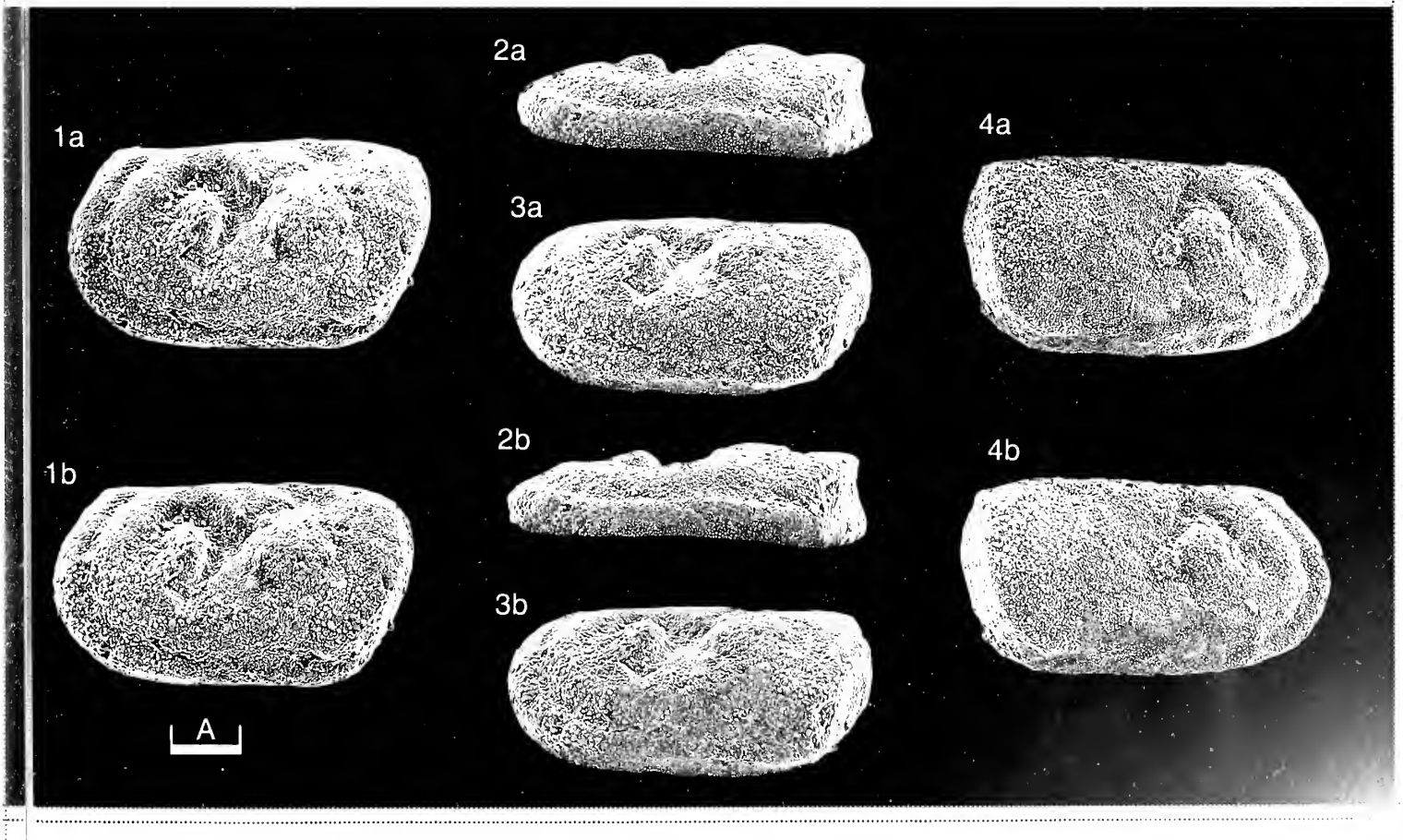
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Stereo-Atlas of Ostracod Shells 18 (5) 17–20 (**1991**)
595.33 (113.312) (766 : 162.098.37) 551.351+552.54

ON *LOMATOPISTHIA AURICULA* (HARRIS)

by Mark Williams
(University of Leicester, England)

Lomatopisthia auricula (Harris, 1957)

1957 *Thomasatia auricula* n. sp. R. W. Harris, *Bull. Okla. geol. Surv.*, **75**, 246, pl. 8, figs. 11a, b.
1964 *Lomatopisthia auricula* (Harris); A. L. Guber & V. Jaanusson, *Bull. geol. Instn Univ. Uppsala*, **43**, 26.

Holotype: Museum of Comparative Zoology, Harvard University, U.S.A., no. **4639**; a heteromorphic carapace.

Type locality: Decker's bed 3 (see Harris, 1957), Bromide Formation, Simpson Group, Middle Ordovician; Rock Crossing Section, Criner Hills, Oklahoma, U.S.A.; approximately latitude 37°08′N, longitude 97°10′W.

Figured specimens: Museum of Comparative Zoology, Harvard University, U.S.A., no. **4639** (♀ car.: Pl. **18**, 18, figs. 1–3). British Museum (Natural History), London, nos. **OS 13496** (♀ car.: Pl. **18**, 18, fig. 4), **OS 13493** (♂ RV: Pl. **18**, 20, figs. 1, 2), **OS 13494** (♀ RV; Pl. **18**, 20, fig. 3), **OS 13495** (♀ LV: Pl. **18**, 20, fig. 4). Holotype from the type locality and horizon. **OS 13494 – 13496** from the Pooleville Member of the Bromide Formation at the type locality. **OS 13493** from a sample in the Mountain Lake Member of the Bromide Formation, Highway 99 Section, Arbuckle Mountains, Oklahoma.

Diagnosis: *Lomatopisthia* species with well developed lobation. Heteromorph with a pronounced extralobal ridge (showing a distinct midventral bend) and two egg-shaped inflations posterior to L4.

Explanation of Plate 18, 18

Figs. 1–3, ♀ car. (holotype, **MCZ 4639**, 0.63 mm long): fig. 1, RV, ext. lat.; fig. 2, RV, ext. lat. obl.; fig. 3, LV, ext. lat. Fig. 4, ♀ car., vent. (**OS 13496**, 0.60 mm long).
Scale A (100 μm; ×85), figs. 1–3; scale B (100 μm; ×87), fig. 4.

Discussion: An inner lamella is well developed in *L. auricula*, being wide anteriorly and narrowing rapidly posteriorly. The same structure has been identified in all congeneric species from Oklahoma, many of which were described by Harris (1957) under other genera.

L. auricula is markedly dimorphic; L3 is very wide in the tecnomorph, but is considerably narrower in the heteromorph because of the posterior domiciliar inflation of the carapace. S3 is strongly developed and crescentic in both dimorphs, whereas in *L. simplex* (Harris, 1957) it tends to be considerably reduced or absent in the heteromorph. The marked midventral bend in the extralobal ridge of the heteromorph of *L. auricula* is apparently not present in the tecnomorph (here the extralobal ridge is more weakly developed).

The two-egg shaped inflations posterior of L4 in the heteromorph of *L. auricula* compare closely with features in the presumed heteromorph of *Saturnites harrisi* Levinson, 1961 (*Micropaleontology*, **7**, 362, pl. 1, fig. 6), the type-species for *Saturnites* Levinson, 1961. The internal features of the latter species are unknown but the genus may be closely related to *Lomatopisthia*.

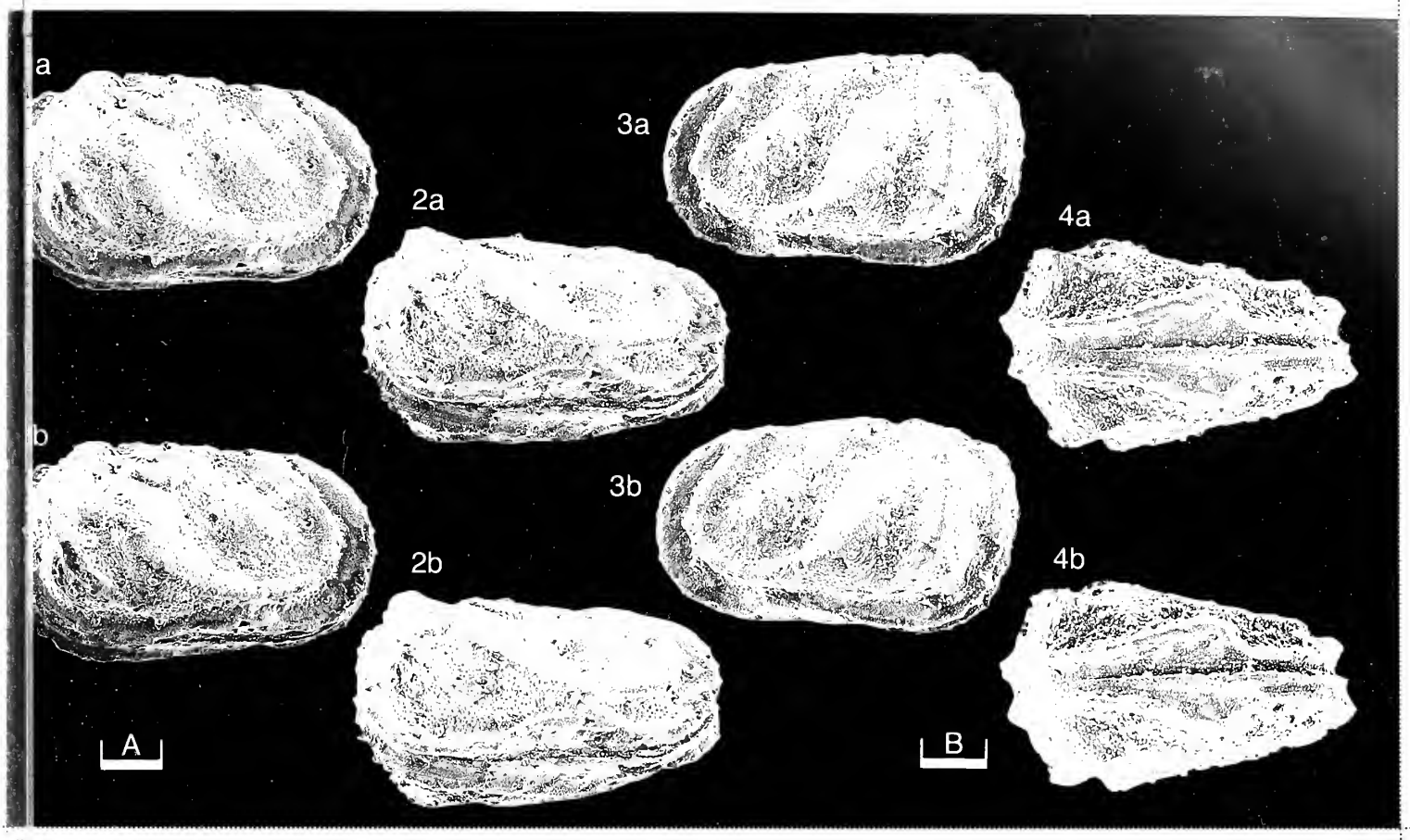
Assemblages of *L. auricula* in the Bromide Formation are very much dominated by heteromorphs. *L. auricula* has the most strongly developed lobation of all *Lomatopisthia* species; for example, see the type-species, *L. simplex* (Harris, 1957), in Williams, M., *Stereo-Atlas Ostracod Shells*, **18**, 13–16, 1991.

Distribution: A species occurring in open marine sediments. Only known from the Mountain Lake and Pooleville members, Bromide Formation, Middle Ordovician Simpson Group of Oklahoma, U.S.A.

Acknowledgement: Dr. David J. Siveter and Mr. Matthew Wakefield (University of Leicester) for useful discussion.

Explanation of Plate 18, 20

Figs. 1, 2, ♂ RV (**OS 13493**, 0.59 mm long): fig. 1, ext. lat.; fig. 2, ext. lat. obl. Fig. 3, ♀ RV, int. lat. (**OS 13494**, 0.63 mm long). Fig. 4, ♀ LV, int. lat. (**OS 13495**, 0.63 mm long).
Scale A (100 μm; ×93), figs. 1, 2; scale B (100 μm; ×84), figs. 3, 4.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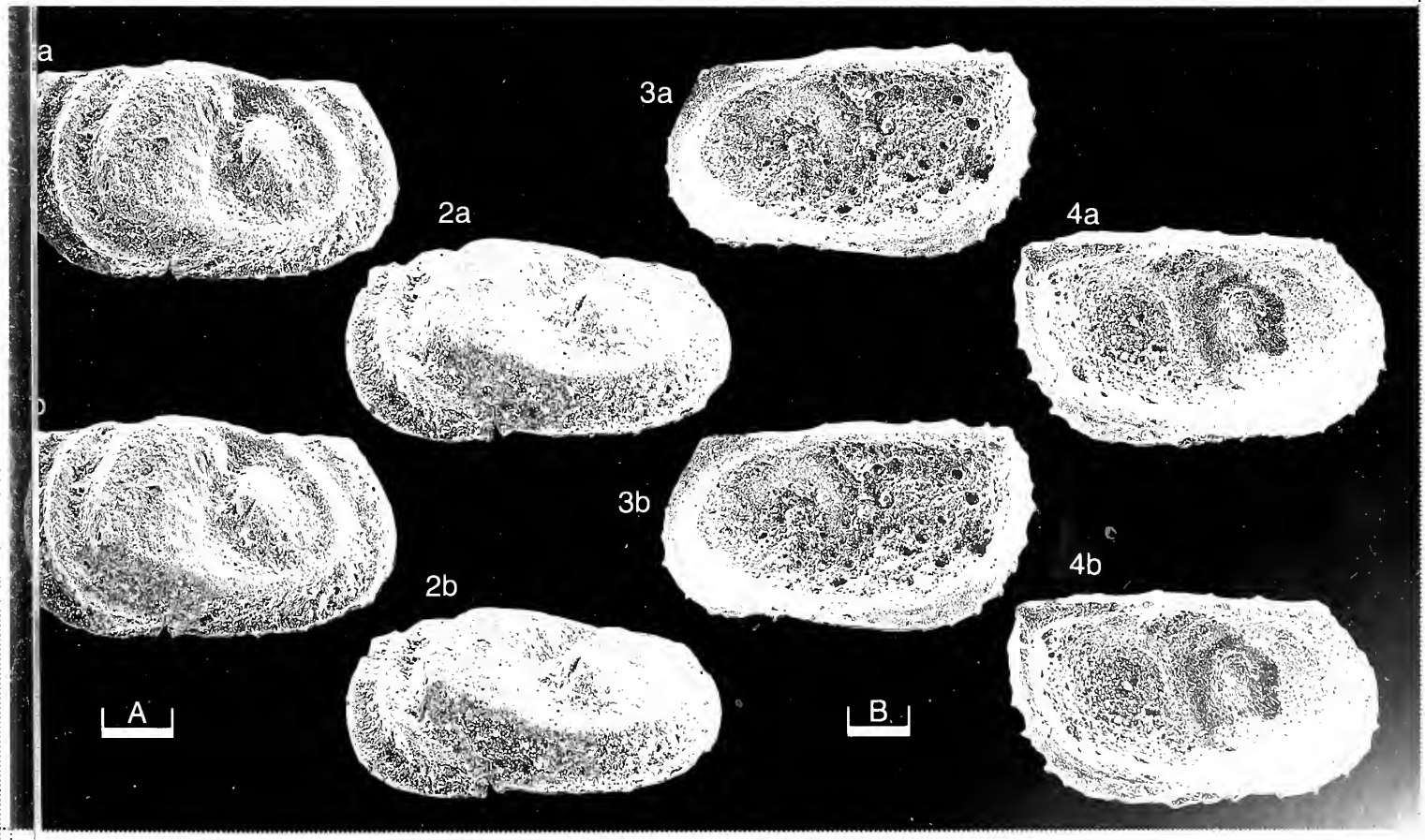
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595.337.23 (113.44) (430 : 161.006.50) : 551.351+552.54

ON *CLEITHRANCHISTE PAULUSI* BECKER

by Gerhard Becker
(University of Frankfurt, Germany)

Genus *CLEITHRANCHISTE* Becker, 1965

Type-species (by original designation): *Cleithranchiste paulusi* Becker, 1965.

Diagnosis: Thick-shelled, large, smooth, asymmetrical (left valve distinctly larger than right valve) thlipsurid genus. Elliptical outline to the carapace; posterior spine(s) only on the right valve. Hinge hemisolen to tripartite, muscle-scar pattern a healdiid cluster of about 30 scars. No marginal structures.

Distribution: Central and possibly W Europe; Middle Devonian; Eifelian and possibly the Givetian.

Cleithranchiste paulusi Becker, 1965

1965 *Cleithranchiste paulusi* sp. nov. G. Becker, *Senckenberg. leth.*, **46**, 371, 372, pl. 28, fig. 1, pl. 29, figs. 5, 6.
1969 *Cleithranchiste paulusi* Becker; G. Becker, *Senckenberg. leth.*, **50**, tabs. 2–4.
1969 *Cleithranchiste paulusi* Becker; H. Groos, *Göttinger Arb. Geol. Paläont.*, **1**, 57.

Holotype: Forschungs-Institut Senckenberg, Frankfurt am Main, Germany, no. **SMF Xe 5146**; an adult carapace.

Type locality: Road cut behind transformer house, W exit from Soetenich village, Soetenich syncline, Eifel

Explanation of Plate 18, 22

Fig. 1, adult car. rt. lat. (holotype, **SMF Xe 5146**, 1100 μm long). Figs. 2, 3, adult RV (paratype, **ex SMF Xe 5149**, 1115 μm long): fig. 2, adductor muscle scar; fig. 3, int. vent. obl.
Scale A (300 μm; ×70), figs. 1, 3; scale B (30 μm; ×230), fig. 2.

Type locality (cont): Mountains, Linksrheinisches Schiefergebirge, Germany; lat. 50°30′N, long. 06°38′W. Dark grey marls with colonies of rugose corals; Rohr Member, Junkerberg Formation, late Eifelian, Middle Devonian. Neritic facies, ostracod fauna of the Eifelian ecotype.

Figured specimens: Forschungs-Institut Senckenberg (**SMF**), Frankfurt am Main, Germany, nos. **SMF Xe 5146** (adult car., holotype: Pl. **18**, 22, fig. 1; Pl. **18**, 24, figs. 2, 3), **ex SMF 5149** (adult RV, paratype: Pl. **18**, 22, figs. 2, 3; Pl. **18**, 24, figs. 4, 5), **ex SMF Xe 5149** (adult LV, paratype: Pl. **18**, 24, fig. 1).

All of the figured specimens are topotype material.

Diagnosis: *Cleithranchiste* species with almost symmetrically elliptical outline to the carapace; posterior end a little more pointed than the anterior one. Right valve with a comparatively strong posteroventral spine and distinct mid-dorsal depression. Dorsal outline of the carapace symmetrically biconvex. Contact groove not interrupted mid-ventrally.

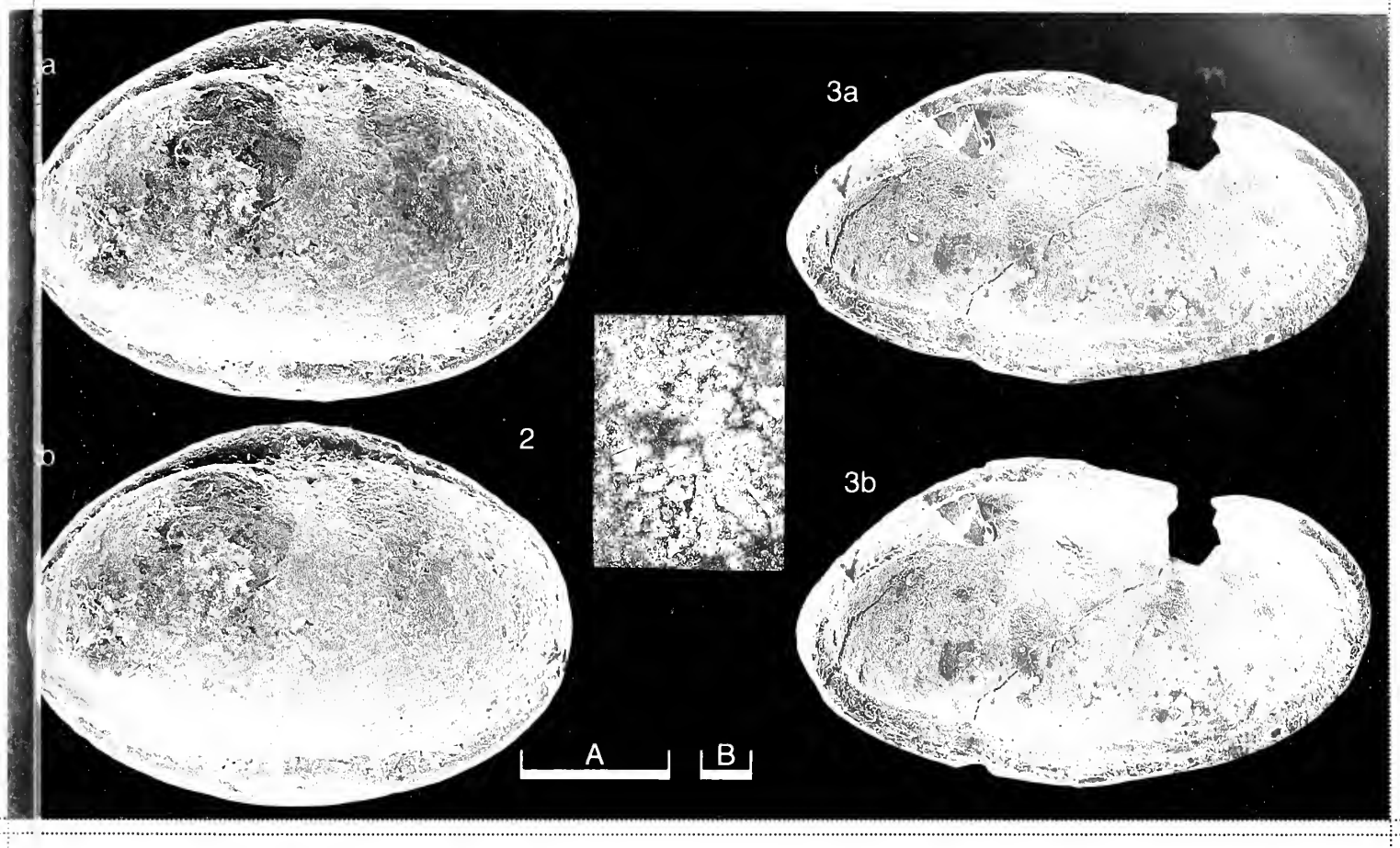
Remarks: *Cleithranchiste paulusi* Becker, 1965 was originally put into the Family Healdiidae Harlton, 1933 (Healdiacea Harlton, 1933, Metacopina Sylvester-Bradley, 1961) because of its 'healdiid' shape, and into the Subfamily Healdiopsidinae Gründel, 1962 because of its tripartite hinge. Adamczak (*Senckenberg. leth.*, **57**, 360, 1976) demonstrated the tripartite hinge to be characteristic of the Superfamily Thlipsuracea Ulrich, 1894 (Metacopina Sylvester-Bradley, 1961) and consequently he assigned *Cleithranchiste* Becker to the Family Thlipsuridae Ulrich, 1894, and the Subfamily Bufininae Sohn & Stover, 1961.

C. quasillitilis Adamczak, 1976, from the Eifelian of the Polish Mittelgebirge, is not closely related to *C. paulusi* Becker; because of its marginal tubercles, it resembles *Bufanchiste* Becker, 1989 (see Becker, G., *Stereo-Atlas Ostracod Shells*, **18**, 25–28, 1991). *C. paulusi* is considered to be a benthic species.

Distribution: Rheinisches Schiefergebirge of Germany; Eifelian, Middle Devonian.

Explanation of Plate 18, 24

Fig. 1, adult LV, int. lat. (paratype, **ex SMF Xe 5149**, 930 μm long). Figs. 2, 3, adult car. (holotype, **SMF Xe 5146**, 1100 μm long): fig. 2, dors.; fig. 3, vent. Figs. 4, 5, adult RV (paratype, **ex SMF Xe 5149**, 1115 μm long): fig. 4, adductor muscle scar; fig. 5, int. lat.
Scale A (300 μm; ×70), figs. 1–5.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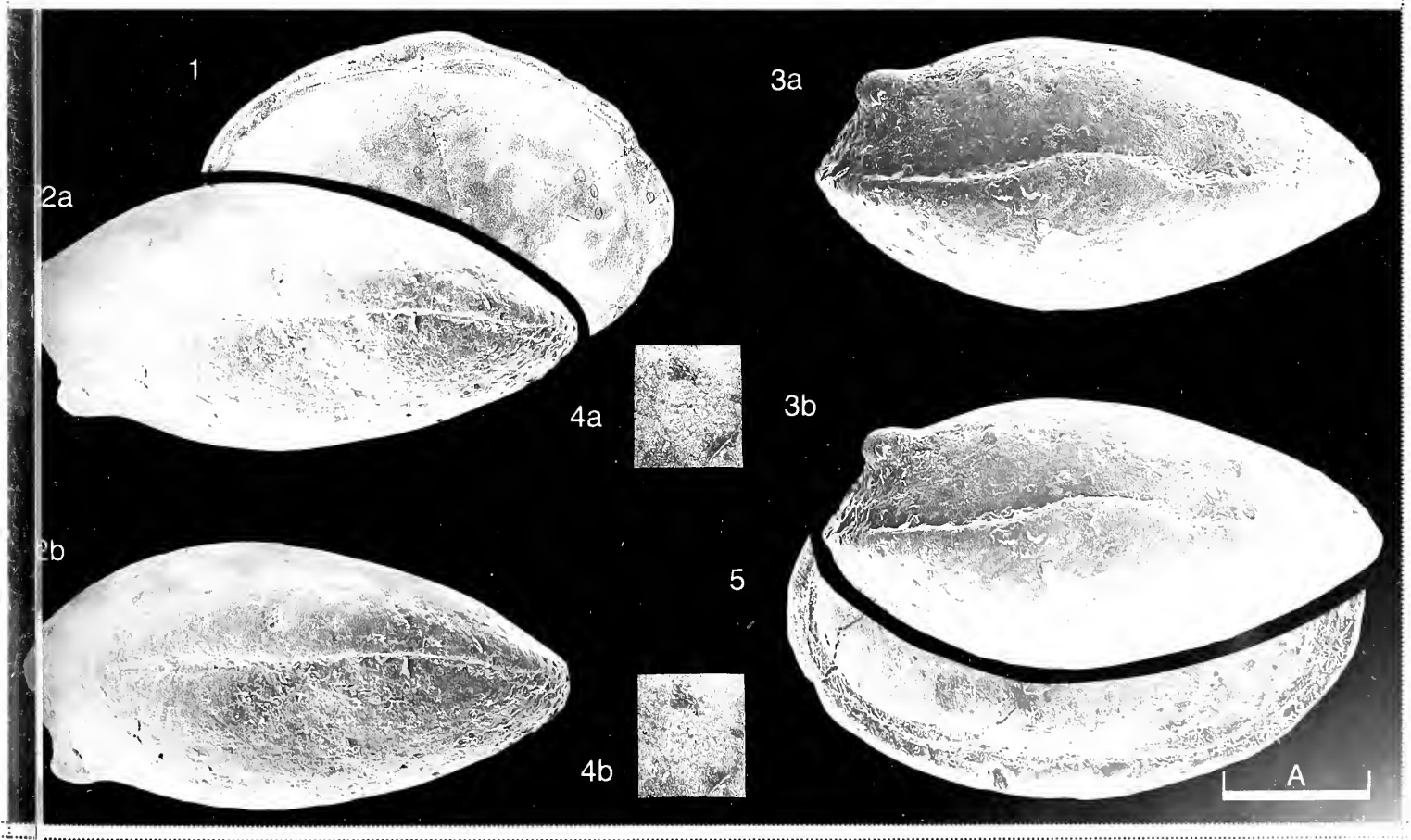
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595.337.23 (113.44) (460 : 162.005.42+64) : 351.352+552.54

ON *BUFANCHISTE SOTOI* BECKER

by Gerhard Becker
(University of Frankfurt, Germany)

Genus *BUFANCHISTE* Becker, 1989

Type-species (by original designation): *Bufanchiste sotoi* Becker, 1989

Diagnosis: Thick-shelled, large, smooth and asymmetrical (left valve larger than right valve) thlipsurid genus. Elliptical outline to the carapace. Two spines on each valve, perpendicularly set off from the surface and situated equidistant from the ends of the valve. Hinge apparently tripartite. Marginal tubercles present.

Distribution: W Europe and N Africa; late Emsian and possibly the late Eifelian, Devonian.

Bufanchiste sotoi Becker, 1989

1989 *Bufanchiste sotoi* sp. nov. G. Becker, *Palaeontographica*, **A 209,** 154, pl. 7, figs. 6, 7, pl. 10, fig. 9, tab. 2.

Holotype: Forschungs-Institut Senckenberg, Frankfurt am Main, Germany, no. **SMF Xe 14395**; an adult carapace.

Type locality: W slope in the valley of the "Arroyo de la Vega", 2 km W of the hamlet of Polentinos, about 10 km NW of Cervera de Pisuerga, Provincia de Palencia, N Spain; lat. 42°57′N, long. 04°32′W. Dark grey marls from the top of the "middle" limestone lens; Polentinos Member, Abadía Formation, late Emsian, Lower Devonian. Pelagic facies *sensu lato*; deeper, open marine environment with ostracod faunas of the Eifelian ecotype.

Explanation of Plate 18, 26

Fig. 1, adult car., ext. rt. lat (holotype, **SMF Xe 14395,** 1710 μm long). Figs. 2, 3, adult LV (paratype, **ex GPIF Cr 20/7,** 1675 μm long): fig. 2, vent., posterior part of valve showing marginal tubercles; fig. 3, int. lat.

Scale A (300 μm; ×48), figs. 1, 3; scale B (90 μm; ×100), fig. 2.

Figured specimens: Forschungs-Institut Senckenberg (**SMF**), Frankfurt am Main, Germany, nos. **SMF Xe 14395** (adult car., holotype: Pl. **18,** 26, fig. 1), ex **SMF 14397** (adult LV, paratype: Pl. **18,** 28, fig. 1), **ex SMF Xe 14400** (adult RV, paratype: Pl. **18,** 28, figs. 2, 3). Geologisch-Palaeontologisches Institut (**GPIF**), Frankfurt am Main, Germany, no. **ex GPIF Cr 20/7** (adult LV, paratype: Pl. **18,** 26, figs. 2, 3).

All the figured paratypes are from the (possibly) late Eifelian; Jebl Rich, Antiatlas area, SW Morocco.

Diagnosis: Relatively very large *Bufanchiste* species with both spines about one quarter of carapace length from the ends of the valve.

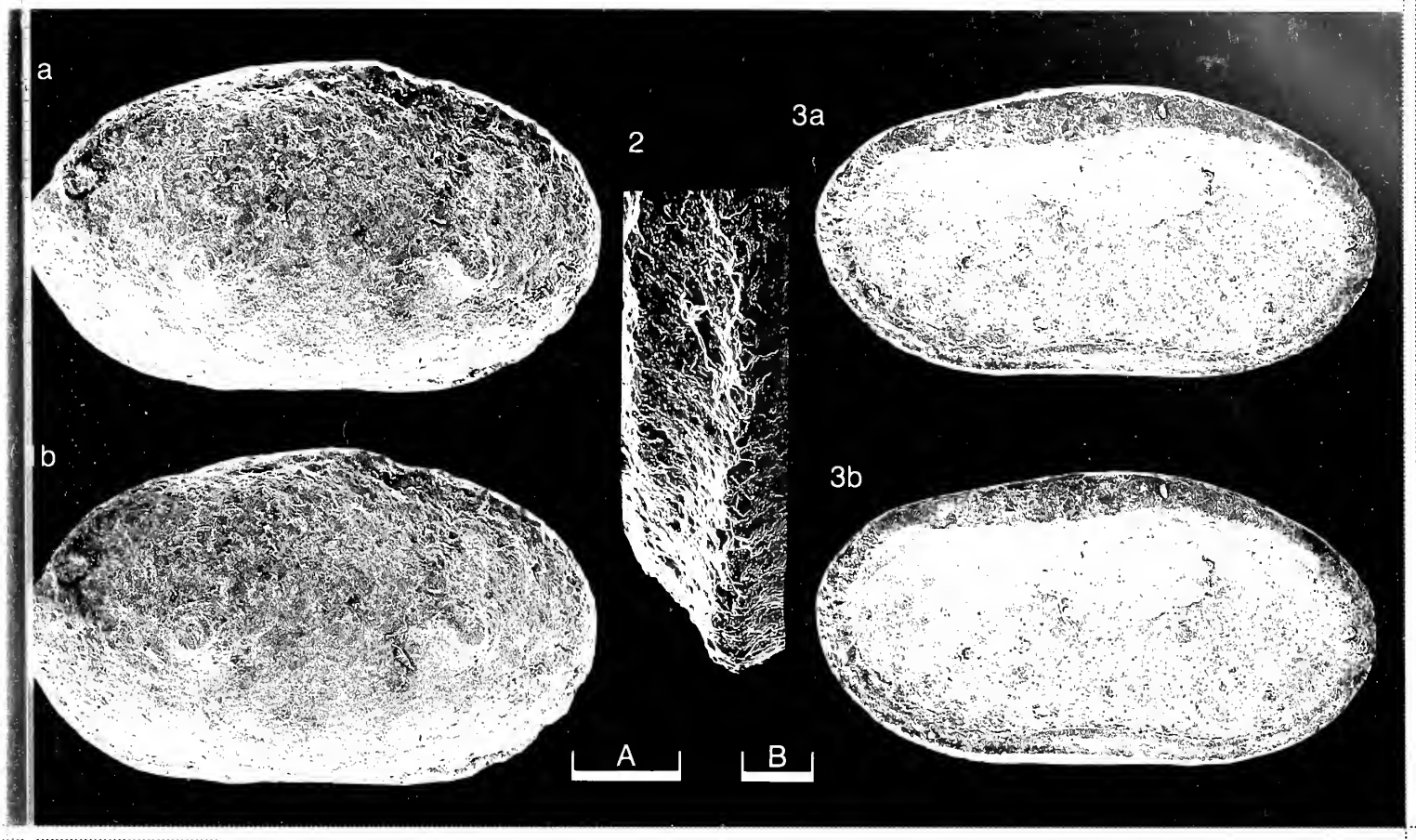
Remarks: *Bufanchiste sotoi* Becker, 1989 is closely related to *Cleithranchiste paulusi* Becker, 1965 (see Becker, G., *Stereo-Atlas Ostracod Shells*, **18,** 21–24, 1991). It is, however, distinguished from this taxon in having an elongated subelliptical lateral outline, two spines on each valve and a row of marginal tubercles. According to Adamczak (*Senckenberg. leth.*, **57,** 368, 1976), the latter feature is characteristic of the Family Bufinidae Sohn & Stover, 1961. *Bufinia* species are distinctly smaller than *Bufanchiste sotoi*; moreover, their lateral outline is subrectangular to subelliptical and the spines (or ridges) are situated asymmetrically on end margins of the valves.

Distribution: Late Emsian, Lower Devonian of the Cantabrian Mountains, N Spain. Also the late Eifelian (?), Middle Devonian, of the Antiatlas of SW Morocco.

Explanation of Plate 18, 28

Fig. 1, adult LV, vent. (paratype, **SMF Xe 14397,** 1850 μm long). Figs. 2, 3: adult RV (paratype, **ex SMF Xe 14400,** 1620 μm long): fig. 2, int. lat. obl.; fig. 3, vent.

Scale A (300 μm; ×40), fig. 1; scale B (300 μm; ×50), figs. 2, 3.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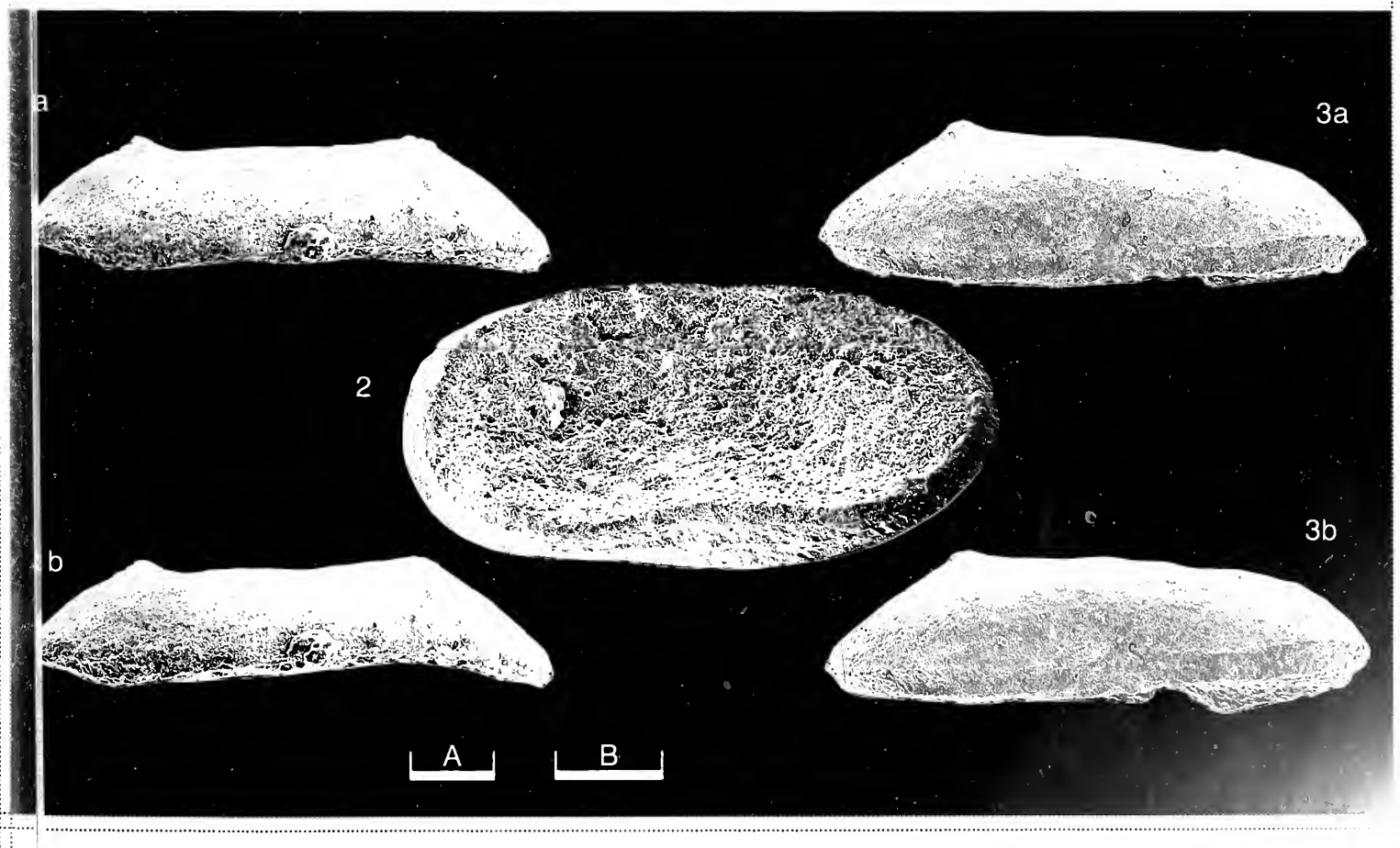
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595.33.336.17 (113.51) (411 : 162.005.55+496.5 : 162.088.34): 551.351+552.52

ON *YOUNGIELLA RECTIDORSALIS* (JONES & KIRKBY)

by Christopher P. Dewey & Janet E. Coker
(Mississippi State University, Mississippi, U.S.A.)

Genus *YOUNGIELLA* Jones & Kirkby, 1886
Type-species (by original designation): *Youngia rectidorsalis* Jones & Kirkby, 1886.

1886 *Youngia* gen. nov. T. R. Jones & W. Kirkby, *Proc. Geol. Ass.*, **9**, 515, figs. 5–7.
1895 *Youngiella* nom. nov. T. R. Jones & W. Kirkby, *Q. Jl geol. Soc. Lond*, **42**, 507 (*pro Youngia* Jones & Kirkby, 1886; *non* Lindstorm, 1885).

Diagnosis: Minute, elongate, subrectangular, smooth youngiellid. Dorsal border straight, hinge taxodont.

Youngiella rectidorsalis (Jones & Kirkby, 1886)

1886a *Youngia rectidorsalis* n. sp. T. R. Jones & W. Kirkby, *Proc. Geol. Assoc.*, **9**, 515, figs. 5–7.
1886b *Youngia rectidorsalis* (Jones & Kirkby); T. R. Jones & W. Kirkby, *Q. Jl geol. Soc. Lond.*, **42**, 507.
1895 *Youngiella rectidorsalis* (Jones & Kirkby); T. R. Jones & W. Kirkby, *Ann. Mag. Nat. Hist.*, ser. 6, **16**, 456, pl. 21, figs. 5a–d.

Lectotype: (Here designated). British Museum (Natural History), London, no. **OS 13641** (ex slide **I 56**). [Paralectotypes nos. **OS 13639, 13640, 13642, 13643,** ex slides nos. **1 1743** and **I 56**].

Type locality: Robroyston, about 4 miles NE of Glasgow, Lanarkshire, Scotland; lat. 55°54′N, long. 4°12′W. Carboniferous Limestone, Visean, Lower Carboniferous.

Figured specimens: British Museum (Natural History), London, nos. **OS 13639**, **13640** (*ex* slide **I 1743**); **OS 13641–13643** (*ex* slide **I 56**). **OS 13639** (car: Pl. **18**, 30, fig. 4), **OS 13640** (RV: Pl. **18**, 32, figs. 1, 2), **OS 13641** (car: Pl. **18**, 30, fig. 3), **OS 13642** (car: Pl. **18**, 30, fig. 2), **OS 13643** (car: Pl. **18**, 30, fig. 1). Dunn-Seiler Museum of Geology, Mississippi State University, U.S.A., nos. **3341–4a** (LV: Pl. **18**,

Explanation of Plate 18, 30

Fig. 1, car. ext. dors. (**OS 13643**, 410 μm long); fig. 2, car., RV ext. lat. (**OS 13642**, 400 μm long); fig. 3 car., LV ext. lat. (lectotype, **OS 13641**, 400 μm long); fig. 4, car. LV ext. lat. (**OS 13639**, 410 μm long). Scale A (100 μm; ×140), figs. 1–4.

Figured specimens (cont): 32, figs. 2, 3), **3341–4b** (LV: Pl. **18**, 32, figs. 4, 5). B.M. (N.H.) specimens are from the type locality: Nos. **3341–4a** and **3341–4b** are from light-brown fossiliferous mudstone, county highway 55, Sec. 35, T5S R11W, Colbert County, Alabama, U.S.A., lat. 34°34′15″N, long. 87°39′15″W.; Bangor Limestone Formation, Chesterian, Mississippian, Carboniferous.

Diagnosis: Minute, sub-oblong; dorsal and ventral margins straight, parallel; ends evenly rounded, posterior end has slight ventral swing. Dorsal aspect suboblong, maximum width at midlength. Surface smooth or faintly reticulate; marginal rims subdued, fade to ventral margin. Hinge taxodont; inner lamella wide, narrows to posterior.

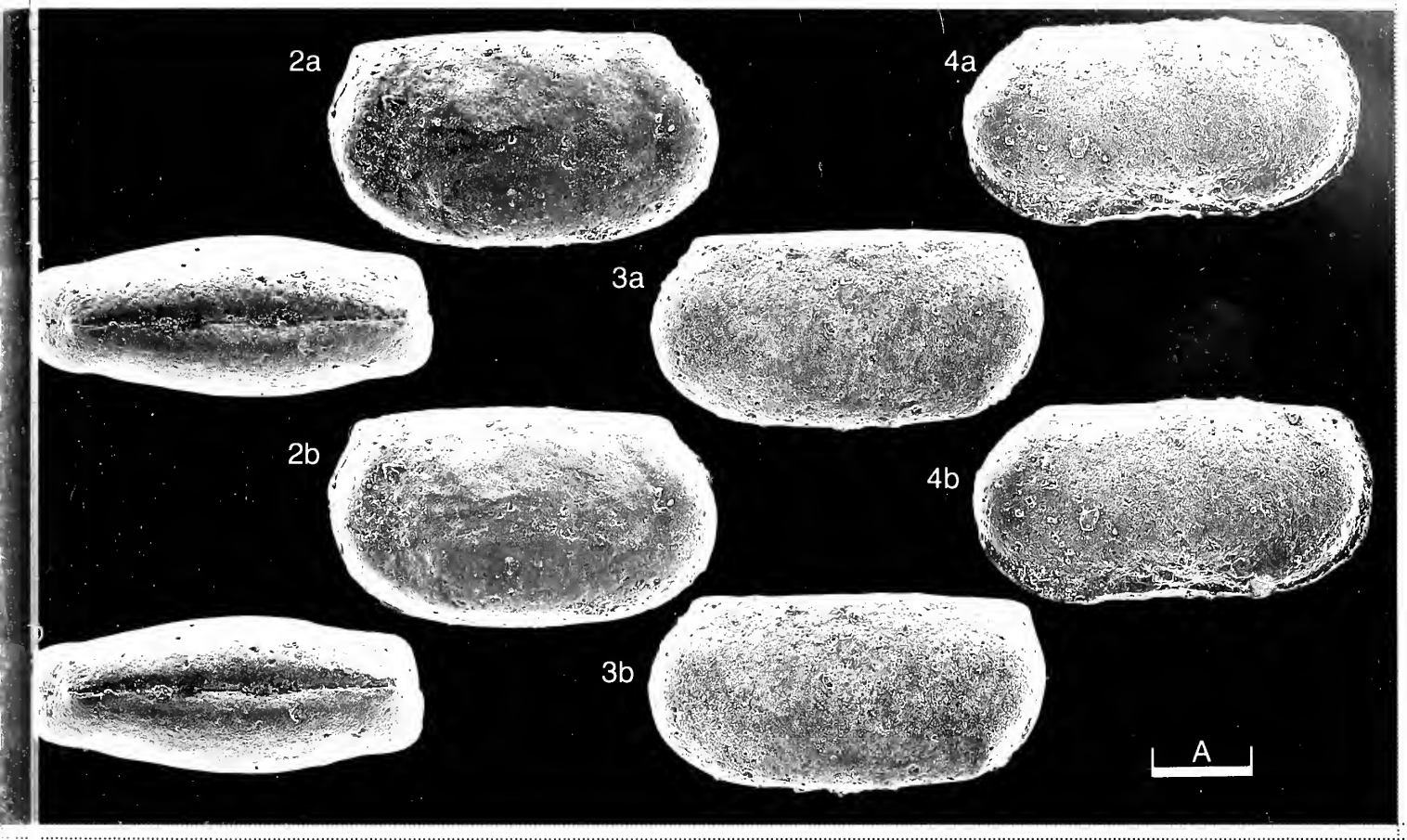
Remarks: Jones & Kirkby (1886a) described the new genus *Youngia* and figured the dorsal and left lateral views of a carapace and a right valve with taxodont hingement. Later in the same year Jones & Kirkby, (1886b, 503, 507, 513) provided a generalised locality together with another description of the genus. Armstrong *et al.* (1876) (*Catalogue of Western Scottish Fossils*, Blackie & Son, Glasgow, 45) listed Robroyston as being the only locality from which *Y. rectidorsalis* had been found. Later, Jones & Kirkby described new material from the Yoredale 'Series' of Dunholme, Yorkshire, England, changed the name of the genus (*Youngia* was preoccupied) and refigured the Scottish material (Jones & Kirkby, 1895, 456, pl. 21, figs. 5a–d). Two slides of *Y. rectidorsalis* exist in the British Museum (Nat. Hist.), both of which include specimens from the upper part of the Carboniferous Limestone of Robroyston, Scotland. One of the slides (**I 56**) was purchased from J. Armstrong in 1880 and the other (**I 1743**) was purchased from W. Kirkby in 1888. The types designated herein are from these slides. No slides of the Yoredale material have been found. Specimens of *Y. rectidorsalis* from the Black Warrior Basin in Alabama, U.S.A., confirm the presence of a taxodont hinge and calcified inner lamella in this species.

Distribution: Europe and U.S.A.; Lower Carboniferous.

Acknowledgement: We wish to acknowledge the financial support given by the Donors of the Petroleum Research Fund administered by the American Chemical Society.

Explanation of Plate 18, 32

Fig. 1, RV int. lat. (**OS 13640**, 400 μm long). Figs. 2, 3, LV (**3341–4a**, 470 μm long): fig. 2, int. lat; fig. 3, ext. lat. Figs 4, 5, LV (**3341–4b**, 405 μm long): fig. 4, int. post. hinge, fig. 5, int. lat.
Scale A (100 μm; ×137), fig. 1; scale B (100 μm; ×130), figs. 2, 3, 5; scale C (20 μm; ×480), fig. 4.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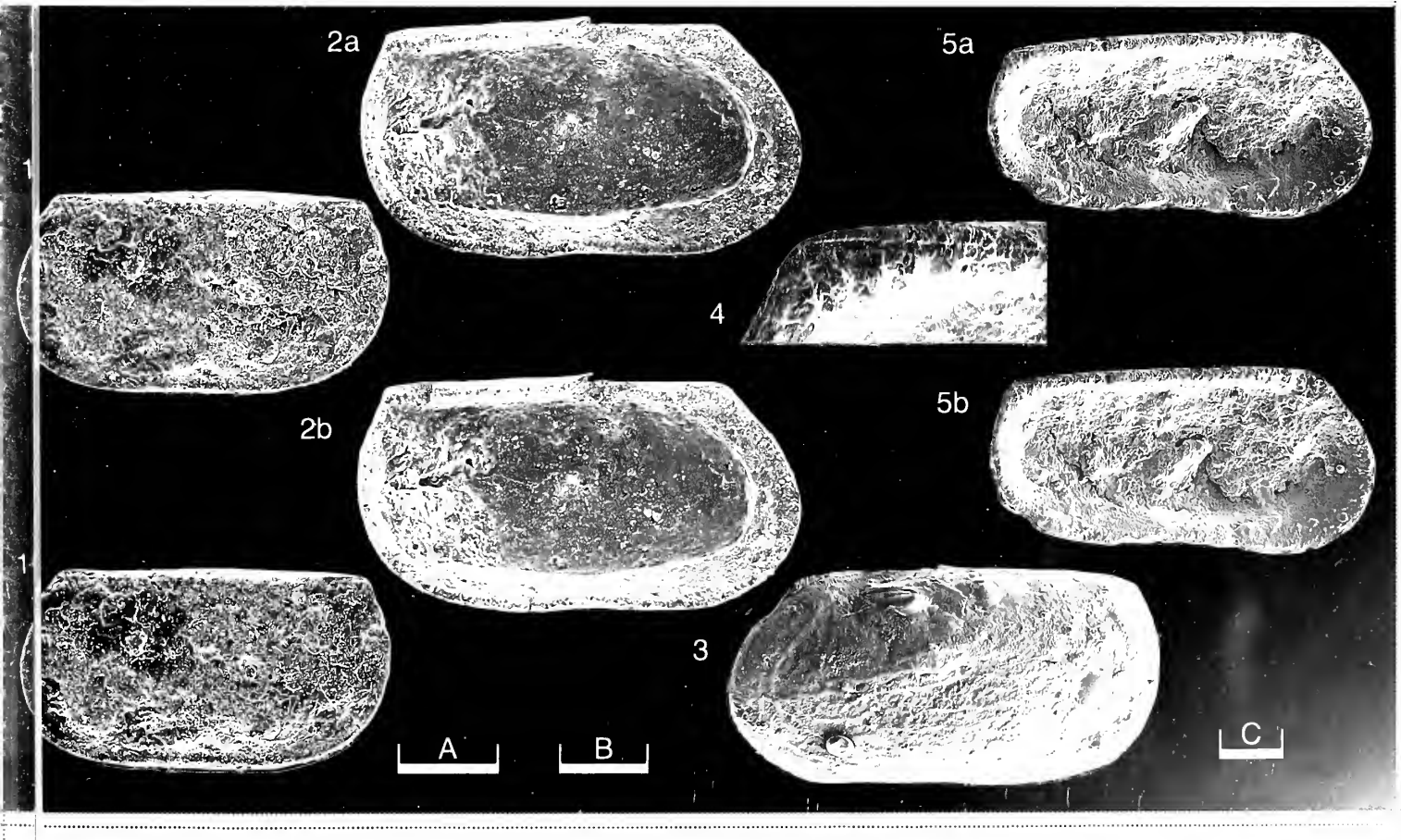
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595.337.14 (116.213) (261.27 : 162.010.50+429 : 162.004.53) : 551.351+552.52

ON *EKTYPHOCYTHERE BIZONI* AINSWORTH

by Ian Boomer & Nigel R. Ainsworth
(University of East Anglia, Norwich & Paleoservices, Watford, England)

Ektyphocythere bizoni Ainsworth, 1986

1986 *Ektyphocythere bizoni* sp. nov. N. R. Ainsworth, *Bull. geol. Surv. Ir.*, **3**, 315, pl. 8, figs. 1–4.

Holotype: Trinity College, Dublin no. **TCD 27570**; ♀ carapace.
[Paratypes nos: **TCD 27571 – 27574**].

Type locality: Fastnet Basin, Deminex Well 56/21-1 (lat. 50°18′54.66″N, long. 09°55′14.06″W). Late Toarcian-Aalenian.

Figured specimens: Trinity College, Dublin no. **TCD 27570** (holotype, ♀ car.: Pl. **18,** 34, figs. 2, 5); British Geological Survey, Keyworth, Nottingham nos. **MPK 6957** (♀ car.: Pl. **18,** 34, fig. 1), **MPK 6460** (♀ LV: Pl. **18,** 34, fig. 3), **MPK 6954** (♂ LV: Pl. **18,** 34, fig. 4), **MPK 6956** (♀ car.: Pl. **18,** 36, fig. 1), **MPK 6952** (♀ RV: Pl. **18,** 36, fig. 2), **MPK 6955** (♂ car.: Pl. **18,** 36, fig. 3), **MPK 6953** (♂ RV: Pl. **18,** 36, fig. 4).

All specimens, apart from the holotype, are from the Mochras Borehole, Dyfed, Wales (Grid Ref. SH 5533 2594); lat. 52°51′00″N, long. 4°06′30″W; Late Toarcian, *Dumorteria levesquei* Zone (*D. levesquei* Subzone), Early Jurassic, at a depth of 605.43 – 606.88 metres.

Diagnosis: Carapace medium sized (550 – 650 μm long), sub-triangular. Ornament of open ribbing arranged in a triangular pattern. Three primary ribs form inverted "V"s above the median line, while two arcuate/straight ribs occur below it. A further two or three longitudinal ribs can be seen along the

Explanation of Plate 18, 34

Fig. 1, ♀ car., ext. dors. (**MPK 6957**, 564 μm long); figs. 2, 5, ♀ car. (holotype, **TCD 27570,** 580 μm long): fig. 2, ext. lt. lat.; fig. 5, ext. rt. lat.; fig. 3, ♀ LV, int. lat. (**MPK 6460**, 603 μm long); fig. 4, ♂ LV, ext. lat. (**MPK 6954,** 603 μm long).
Scale A (100 μm; ×90), figs. 1–5.

Diagnosis (cont): ventral and ventro-lateral surfaces. Intercostate regions smooth. Hinge antimerodont. Inner lamella wide anteriorly, narrow posteriorly, no vestibula present. Anterior marginal pore canals and muscle scars not observed.

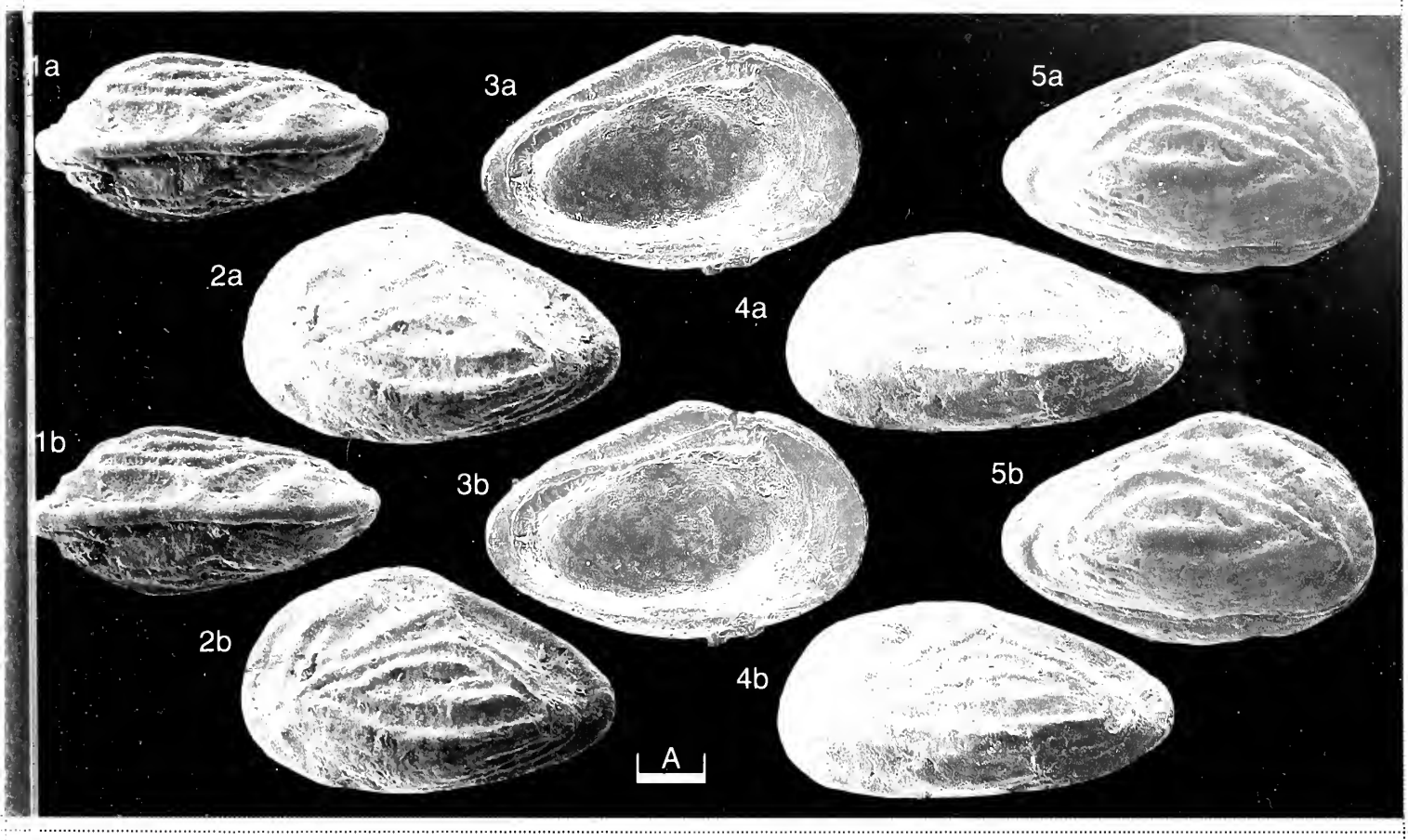
Remarks: A species externally similar to both *Ektyphocythere champeauae* (Bizon, 1960, *Rev. Micropaléont.*, **2,** 206, pl. 1, fig. 1; pl. 22, fig. 1) and *E. vitilis* (Apostolescu *et al.*, 1961, *in* R. Mouterde (Ed.), *Mém. Bur. Rech. géol minièr.*, **4,** 399, pl. 1, fig. 1), but can be distinguished by the greater number of primary longitudinal ribs. The specimen figured by Lord (1974) as *E.* cf. *E. champeauae* (*Palaeontology*, **17,** 614, pl. 90, fig. 16), appears similar to the present species although the longitudinal ribs in his specimen seem more strongly developed. *E. furcata* (Weinholz) (*in* N. Stoermer & E. Weinholz, 1967, *Jb. Geol.*, **1** (for 1965), 548, pl. 2, figs. 19, 20), described from the Toarcian of S. Germany, is similar to *E. bizoni*; however, the former is slightly larger with more robust ribbing.

In a review of N.W. European Liassic reticulate ostracods, Herrig (1985, *Wiss. Z. Ernst-Moritz-Arndt Univ. Griefswald*, **34** (4), 45–50) erected the genera *Nudacythere, Ernstella* and *Rucholzella*. He considered *E. vitilis, E. furcata* and *E. champeauae* to belong to *Nudacythere*, with the last-named as type species. The new genera of Herrig were erected on differences in the development of the ribbing within the genus *Ektyphocythere*. We believe that since the hingement, muscle scar patterns and marginal features within "*Ektyphocythere*" species are constant, generic differentiation based on development of ornament alone is unnecessary.

Distribution: In the type area, poor stratigraphical control precludes an accurate assessment of the species range. In the Mochras section, *E. bizoni* first appears near the top of the *H. variabilis* Zone, M. Toarcian, becoming an abundant faunal element towards the top of the Lower Jurassic. Due to the presence of an almost complete Lower Jurassic section at this site, it is assumed that the species ranges into the Middle Jurassic.

Explanation of Plate 18, 36

Fig. 1, ♀ car., ext. rt. lat. (**MPK 6956,** 551 μm long); fig. 2, ♀ RV, int. lat. (**MPK 6952,** 513 μm long); fig. 3, ♂ car., ext. rt. lat. (**MPK 6955,** 577 μm long); fig. 4, ♂ RV, int. lat. (**MPK 6953,** 538 μm long).
Scale A (100 μm) ×90), figs. 1, 3; scale B (100 μm; ×114), figs. 2, 4.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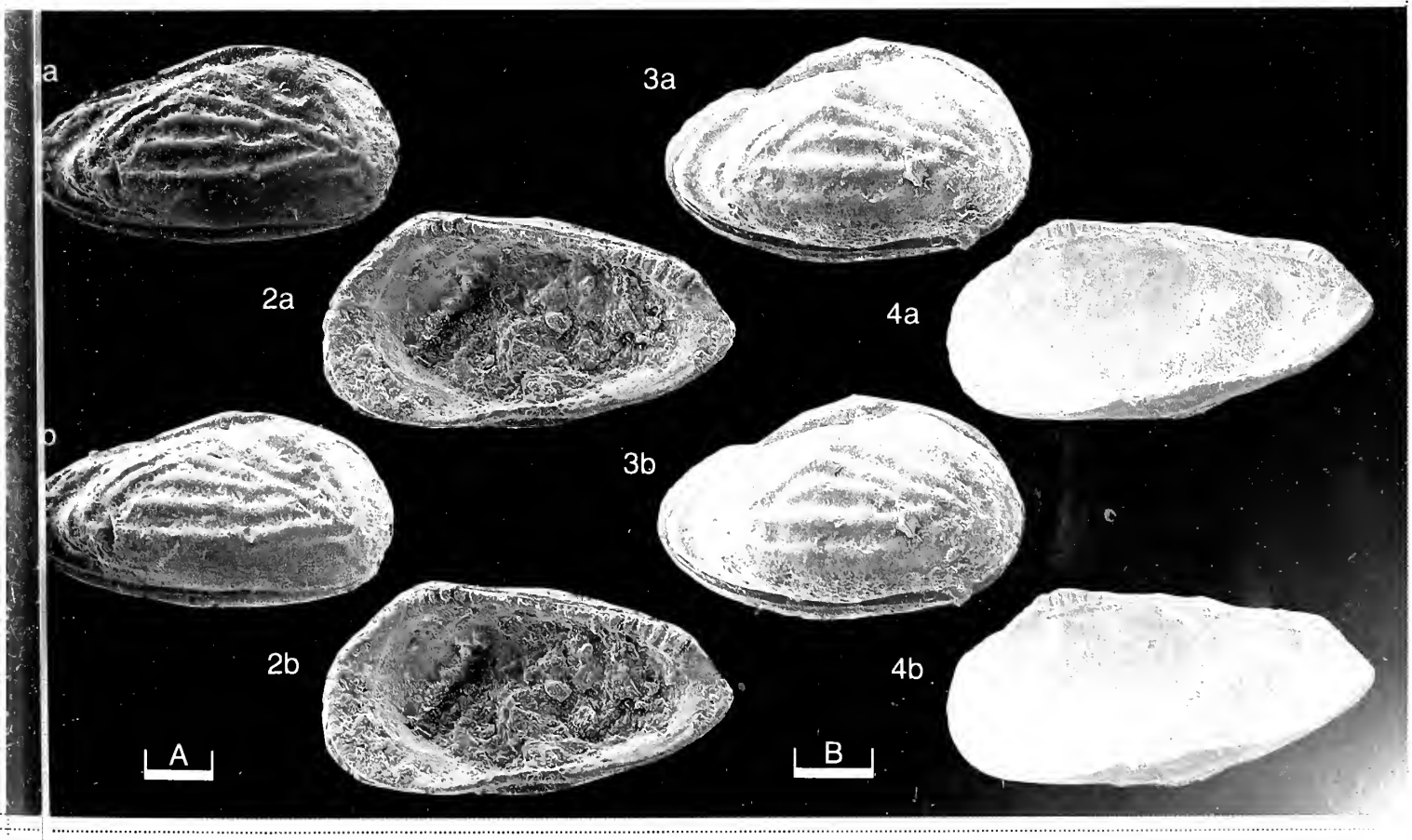
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Stereo-Atlas of Ostracod Shells 18 (10) 37–40 **(1991)**
595.337.14 (116.333.3) (460 : 161.004.42) : 551.312.4+552.52

ON *FRAMBOCYTHERE TUMIENSIS* (HELMDACH) *FERRERI* COLIN

by Jean-Paul Colin
(Esso Rep, Bègles, France)

Frambocythere tumiensis (Helmdach) *ferreri* Colin, 1980

1971 *Bisulcocypris* (2 spp.?) A. Liebau, *Bull. Cent. Rech. Pau*, **5** suppl., 596, pl. 1, figs. 6, 7.
1980 *Frambocythere tumiensis ferreri* (*sic*) gen. et. subsp. nov., J.-P. Colin, *in* J.-P. Colin & D. L. Danielopol, *Paleobiol. contin.*, **11**, 16, pl. 8, figs. 1–10.
1980 *Frambocythere tumiensis ferreri* Colin; J.-F. Babinot, *Trav. Lab. Géol. hist. Paléont. Univ. Provence*, **10**, 232, pl. 46, figs. 5–14.
1985 *Frambocythere tumiensis ferreri* Colin; J.-F. Babinot, J.-P. Colin & R. Damotte, *Bull. Cent. Rech. Explor.-Prod. Elf-Aquitaine*, Mém. **9**, 222, 254, pl. 70, figs. 8–14.

Holotype: Author's collection, no. **P 29-1**; ♀ left valve.

Type locality: Els Miquels de Moror, Lerida Province, Spain (lat. 42°04′10″N, long. 04°30′40″E) (see J. M. Pons, *Publnes. Geol. Univ. Auton. Barc.*, **3**, 1–105, 1977). Lagoonal facies with charophytes. Late Maastrichtian (Garumnian).

Figured specimens: Author's collection, nos. **P 29-1** (♀ LV: Pl. **18**, 38, fig. 1), **P 29-2** (♀ RV: Pl. **18**, 38, fig. 2), **P 29-3** (♂ RV: Pl. **18**, 38, fig. 3), **P 29-4** (♀ RV: Pl. **18**, 40, fig. 1), **P 29-5** (♂ LV: Pl. **18**, 40, fig. 2), **P 29-6** (♀ RV: **18**, 40, fig. 3).
All are from the type locality.

Explanation of Plate 18, 38

Fig. 1, ♀ LV, ext. lat. (holotype, **P 29-1,** 485 μm long); fig. 2, ♀ RV ext. lat. (**P 29-2,** 476 μm long); fig. 3, ♂ RV, ext. lat. (**P 29-3,** 461 μm long).
Scale A (100 μm; ×140), figs. 1–3.

Remarks: *Frambocythere* was erected by Colin (*in* Colin & Danielopol, 1980, *op. cit.*, 15) with *Bisulcocypris tumiensis tumiensis* Helmdach as type species. The genus, a member of the Timiriaseviinae, is characterised by its small size, the presence of two subvertical sulci, pustulose ornamentation ("raspberry"-type, hence the name), pronounced sexual dimorphism (females with a well developed brood pouch) and a right valve larger than the left (i.e. inverse).

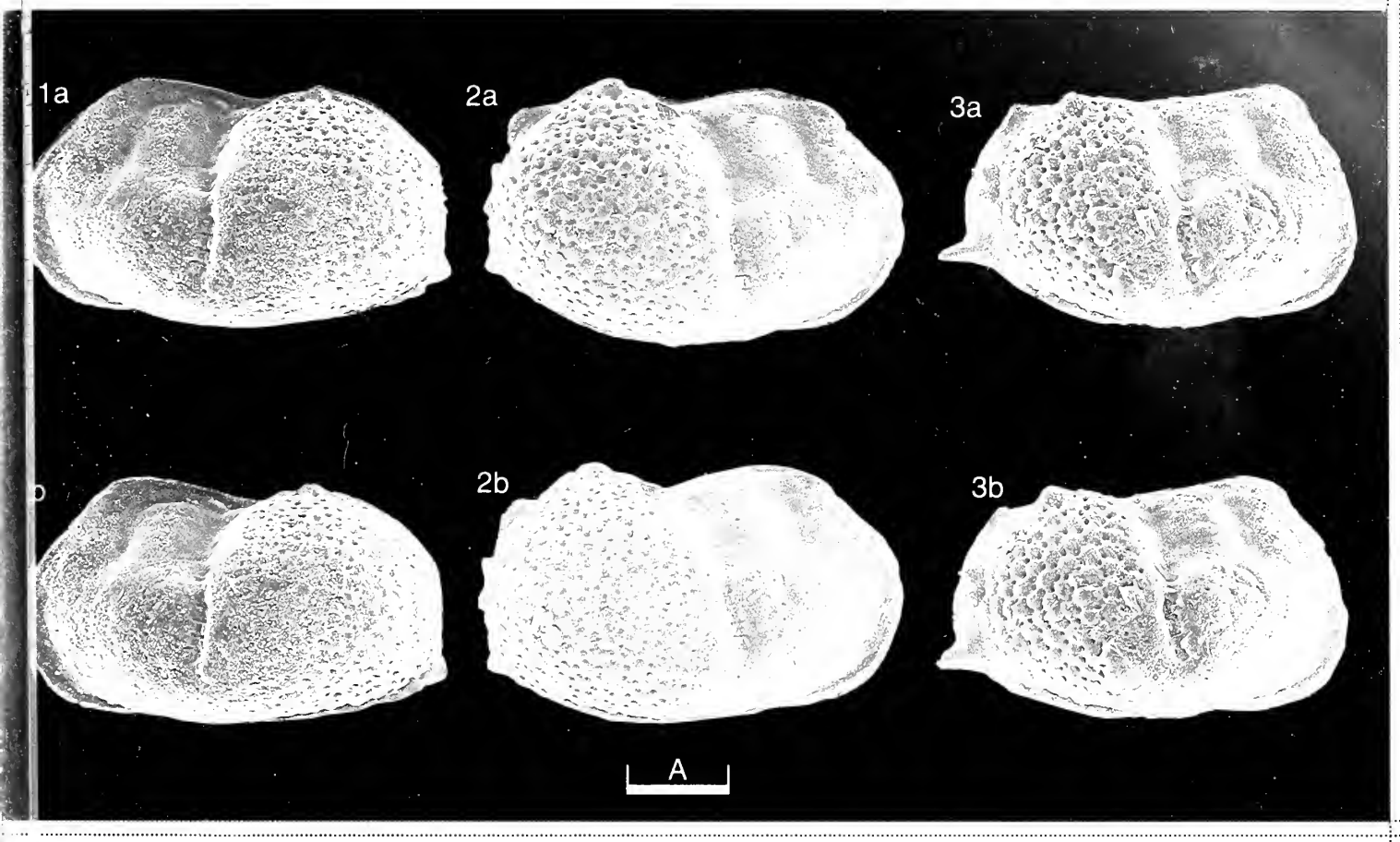
F. tumiensis ferreri differs from the other subspecies *F. tumiensis tumiensis* (Helmdach) and *F. tumiensis aepleri* (Helmdach) (F. F. Helmdach, *Berl. geowiss. Abh.*, (A), **3**, 71–78, 1978), from the Maastrichtian of N Spain, and *F. tumiensis* (Helmdach) *ludi* Tambareau (Y. Tambareau, *Rev. Micropaléont.*, **27**, 145–148, 1984), from the Montian of Belgium, essentially by its unornamented anterior half. Other characters are typical of the genus.

Distribution: Late Maastrichtian (early Garumnian) of northern Spain (Pons, 1977, *op. cit.*; Colin & Danielopol, 1980, *op. cit.*) and of southern France (early Garumnian and Rognacian) (Babinot, 1980, *op. cit.*; 1986, *Bull. Soc. linn. Provence*, **38**; Babinot *et al.*, 1985, *op. cit.*; Bilotte *et al.*, 1983, *Géol. méditerr.*, **10**).

Acknowledgements: Dr. J.-F. Babinot (University of Marseille) is sincerely thanked for providing the SEM micrographs.

Explanation of Plate 18, 40

Fig. 1, ♀ RV, int. lat. (**P 29-4,** 470 μm long); fig. 2, ♂ LV, int. lat. (**P 29-5,** 453 μm long); fig. 3, ♀ RV, dors. (**P 29-6,** 484 μm long).
Scale A (100 μm) ×140), figs. 1–3.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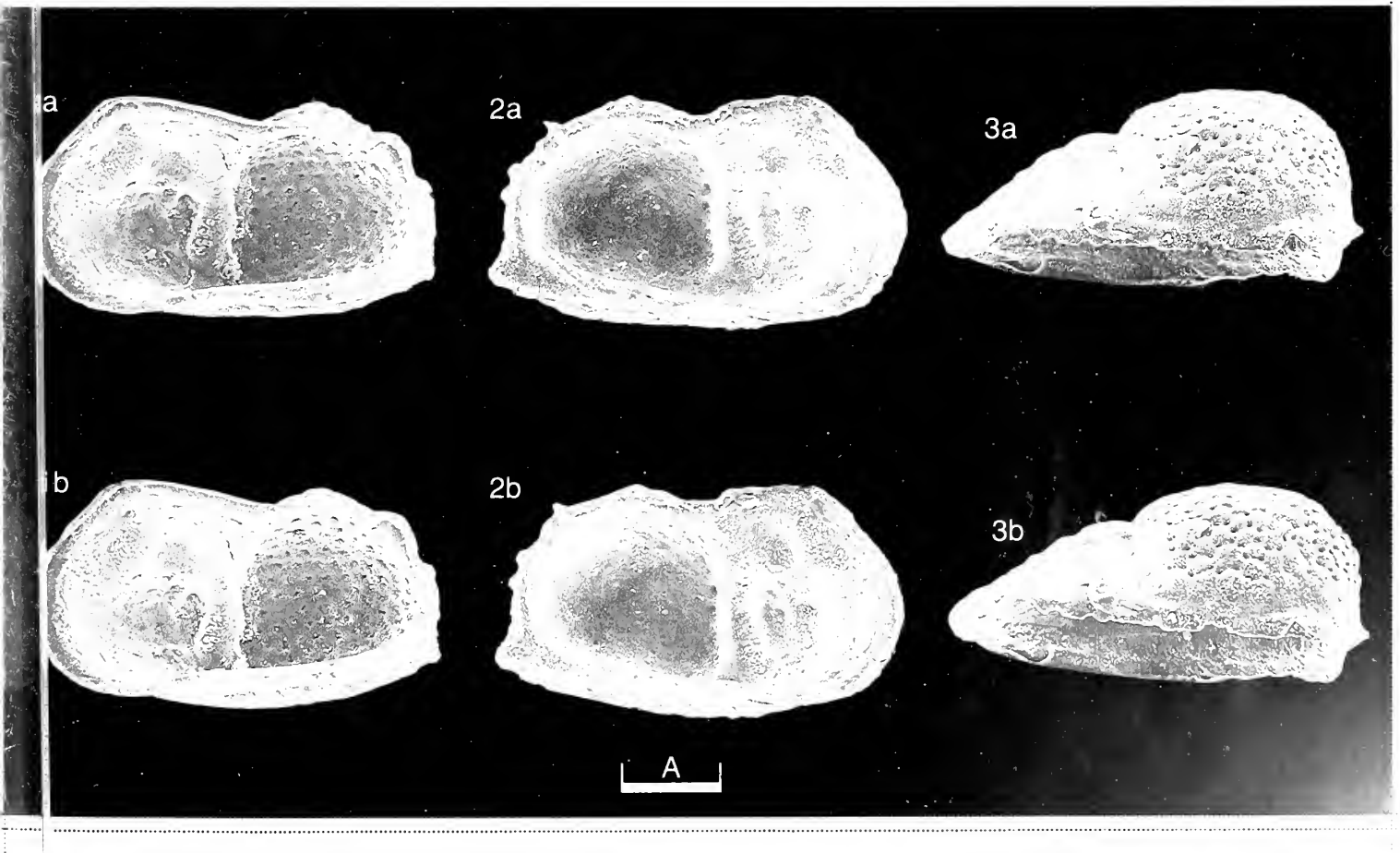
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595.337.12 (116.333.3) (44 : 161.005.43) : 551.312.4+552.51+552.57

ON *VALDONNIELLA MACKENZIEI* BABINOT

by Jean-François Babinot
(Université de Provence, Centre Saint-Charles, Marseille, France)

VALDONNIELLA Babinot, 1980

Type-species (by original designation): *Valdonniella mackenziei* Babinot, 1980

Diagnosis: Carapace elongated, slightly arched in lateral view; left valve overlaps right in the anterior half of the dorsal margin and medioventrally; a smaller overlap particularly evident at the posterior cardinal angle. Greatest height in front of mid-point; anterior of this, dorsal margin of RV concave, posteriorly convex. Carapace regularly inflated in dorsal and ventral view; ornamentation mostly smooth. Hinge merodont (lophodont) with smooth ridge-like anterior tooth. Central muscle scars: 2 dorsal subcircular scars, 3 more-or-less connected scars in a horizontal line and 1 small scar below. Marginal zones with wide anterior and posterior vestibulum, marginal pore-canals numerous, straight; selvage strong, peripheral. Sexual dimorphism inconspicuous.

Remarks: This genus displays several distinctive characters including the configuration of the central muscle scars (Babinot, 1980, 239, text-fig. 8) and a pronounced anterio-dorsal overlap of the right valve. *Valdonniella* shows some similarities with the Candonidae, particularly the lateral outline and marginal zones. However, *Candona* Baird has a row of 5 subcircular scars, while *Candonopsis* Vàvra has 4 circular scars, another scar elongated below and 2 small accessory scars; both have an adont hinge.

Explanation of Plate 18, 42

Fig. 1, LV, int. lat. (**PVF 6/11,** 610μm long); fig. 2, car., ext. lat. (**PVF 6/12,** 620μm long); fig. 3, RV, int. lat. (holotype, **HVF 6,** 610μm long). Scale A (200μm; ×96), figs. 1–3.

Valdonniella mackenziei Babinot, 1980

1980 *Valdonniella mackenziei* n. gen., n. sp., J.-F. Babinot, *Trav. Lab. Géol. hist. Paléont. Univ. Provence,* **10,** 240, pl. 47, figs. 14–16, pl. 48, figs. 1–8.

1985 *Valdonniella mackenziei* Babinot; J.-F. Babinot *et al., Bull. Cent. Rech. Explor.-Prod. Elf-Aquitaine, Mém.* **9,** 222, 252, pl. 69, figs. 7–11.

1987 *Valdonniella mackenziei* Babinot; J.-F. Babinot, *Géol. méditerr.,* **14,** 3, pl. 2, fig. 22.

Holotype: Université de Provence, Centre Saint-Charles (Centre de Sédimentologie et Paléontologie) no. **HVF 6;** RV.

Type locality: Les Ferrages, near La Fare-Les-Oliviers, Bouches-du-Rhône, SE France; approx. lat. 43°33′N, long. 05°15′E. Valdonnian, late Cretaceous. In grey marls with lignitic horizons, molluscs, gastropods and charophytes.

Figured specimens: Université de Provence, Centre Saint-Charles nos. **PVF 6/11** (paratype, LV: Pl. **18,** 42, fig. 1), **PVF 6/12** (paratype, car.: Pl. **18,** 42, fig. 2), **HVF 6** (holotype, RV: Pl. **18,** 42, fig. 3), **PVF 6/13** (paratype, car.: Pl. **18,** 44, fig. 2), **PVF 6/16** (paratype, car.: Pl. **18,** 44, fig. 1), **PVF 6/17** (paratype, car.: Pl. **18,** 44, fig. 3).

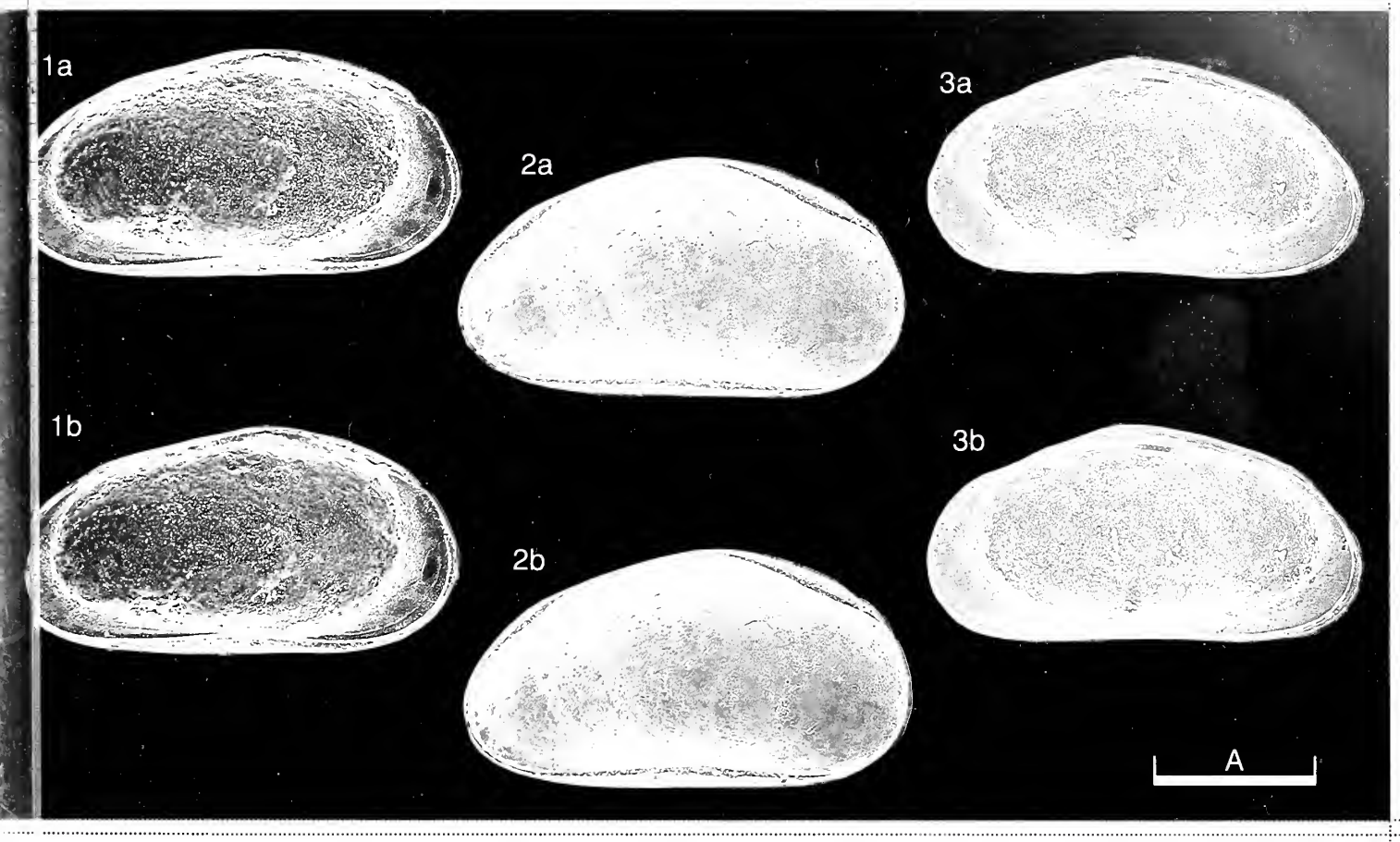
All specimens from type locality.

Diagnosis: As for the genus; *Valdonniella* is currently monotypic.

Distribution: Only known from oligohaline to freshwater deposits in the Valdonnian of southeastern France. The age of the "Valdonnian" is in debate: magnetostratigraphic studies show it to be latest Santonian, whereas previously it had been regarded as early Campanian.

Explanation of Plate 18, 44

Fig. 1, car., dors. (**PVF 6/16,** 620μm long); fig. 2, car., ext. lat. (**PVF 6/13,** 610μm long); fig. 3, car., vent. (**PVF 6/17,** 610μm long). Scale A (200μm) ×96), figs. 1–3.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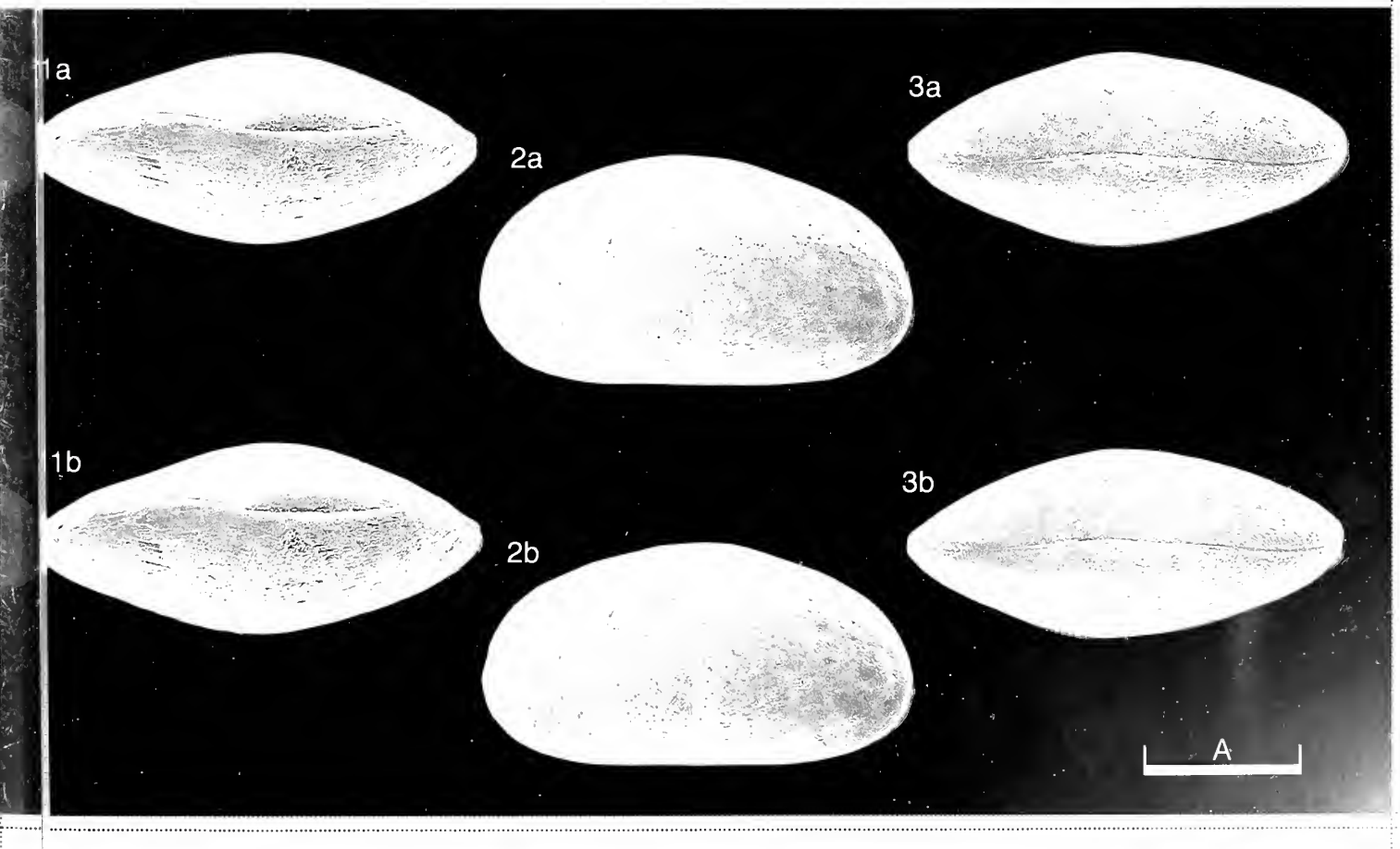
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ON *HEMINGWAYELLA PUMILIO* (BRADY)

by Robin C. Whatley & Caroline A. Maybury
(Institute of Earth Studies, University College of Wales, Aberystwyth, U.K.)

Hemingwayella pumilio (Brady, 1880)

1880 *Bythocythere pumilio* sp. nov., G. S. Brady, *Rep. scient. Results Voy. Challenger, (Zool.)*, **1** (3), 142, pl. 33, figs. 4a–d.
1976 *Bythocythere pumilio* Brady; H. S. Puri & N. C. Hulings, *Bull. Br. Mus. nat. Hist.* (Zool.), **29,** 309, pl. 22, figs. 6–8.

Lectotype: British Museum (Nat. Hist.) no. **81.5.52;** carapace. Designated by Puri & Hulings (1976, *op. cit.*).

Type locality: *Challenger* Stn. 149, Balfour Bay, Kerguelen Island (lat. 49°08′S, long. 70°12′W). Depth 20–50 fathoms, in mud. Collected January 1874.

Figured specimens: Kansas University Museum, Institute of Paleontology, Lawrence, Kansas, U.S.A. nos. **KUMIP 1,084,564** (car.: Pl. **18,** 46, fig. 1), **KUMIP 1,084,565** (car.: Pl. **18,** 46, fig. 2), **KUMIP 1,084,566** (car., subsequently disarticulated: RV – Pl. **18,** 46, fig. 3; Pl. **18,** 48, figs. 3, 4; LV – Pl. **18,** 48, figs. 5, 6), **KUMIP 1,084,567** (car.: Pl. **18,** 48, fig. 1), **KUMIP 1,084,568** (car.: Pl. **18,** 48, fig. 2). All specimens from Magellan Straits (lat. 52°37.3′S, long. 69°35.8′W), depth 9 m.

Diagnosis: Carapace small (adults 450–500 μm in length), sub-rectangular, tumid, widest ventrally. Ornament reticulate with elongate cribrose fossae, the long axes of which are vertical or slightly oblique; median sulcus present, below and anterior to which is an inflated triangular area with 4 horizontal muri; a strong, smooth alar ridge extends from anterior margin of valve to blunt process posteroventrally (this ridge delimits rounded and inflated lateral surface from flattened venter); a

Explanation of Plate 18, 46

Fig. 1, car., ext. lat. (**KUMIP 1,084,564,** 500μm long); fig. 2, car., ext. lat. (**KUMIP 1,084,565,** 500μm long); fig. 3, RV, int. lat. (**KUMIP 1,084,566,** 480μm long).
Scale A (100μm; ×130), figs. 1–3.

Diagnosis (cont): distal rib extends subparallel to margin from eye tubercle, diverging before curving back to it at posterior cardinal angle. Calcareous inner lamella wide, particularly anteriorly where there is a shallow vestibulum. Hinge of RV with smooth, single teeth terminally separated by a long, strongly locellate groove. Four adductor muscle scars, frontal scars not seen.

Remarks: The material from the Magellan Straits and the Atlantic coast of Patagonia is identical with the lectotype of Brady's species from Kerguelen Island (Dr. J. E. Whittaker, pers. comm.).

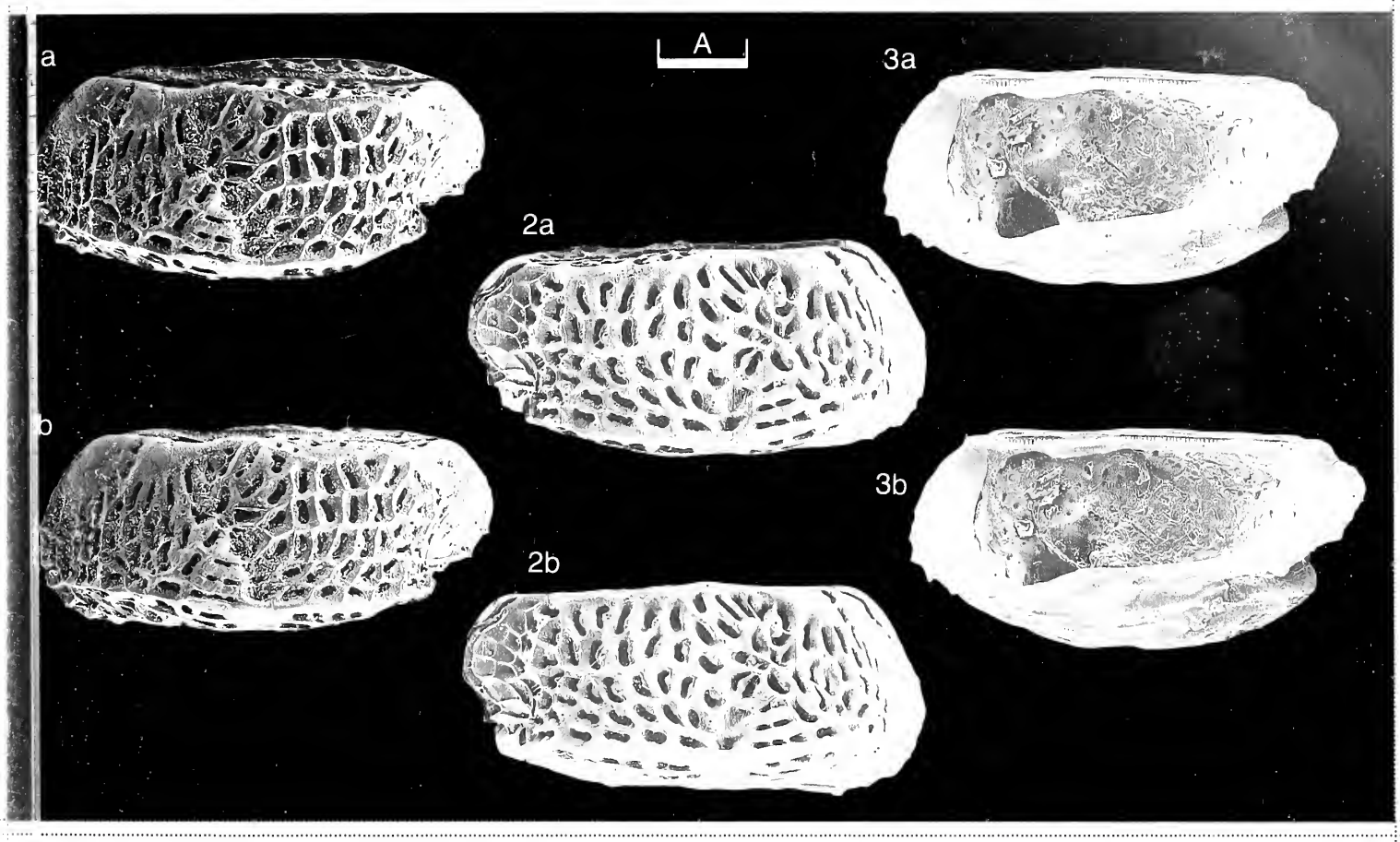
The genus *Hemingwayella* (J. W. Neale, *Spec. Pap. Palaeont.*, **16,** 30, pl. 13, figs. 8, 9; pl. 20, figs. 3–6, text-figs. 5c, d, f, 1975) was first described from the Santonian, Upper Cretaceous of Western Australia. All species of the genus possess the characteristic inflated, triangular area antero-ventral of the median sulcus. The genus appears to be rare today and *H. pumilio* and an undescribed species known to us from the Falkland Islands are possibly the only living representatives. Such species as ?*Eucytherura amfibola* Barbieto-Gonzàlez (1971, *Mitt. hamb. zool. Mus. Inst.*, **67,** 301, pl. 27, figs. 1a, 2a, 3a) from the Mediterranean are only superficially similar to *Hemingwayella*.

The oldest species of the genus known to the authors is *H. aranea* (Valicenti & Stephens, 1984) (*Revta. esp. Micropaleont.*, **16,** 187, pl. 4, figs. 8–10; pl. 5, figs. 1–5) from the Valanginian of the Alyoa Basin, South Africa.

Distribution: Recent of Kerguelen Island, S Indian Ocean (Brady, 1880), the Magellan Straits (9–25 m depth) (Kaesler *et al.*, 1979, *Proc. VIIth Int. Symp. Ostracodes*, Serbian Geol. Soc., 239; and herein), and the Argentinian coast from approx. 36° to 53°S in the intertidal zone and in offshore sediments down to 131m water depth (Toy, 1985; Chadwick, 1986, Unpubl. M.Sc. theses, Univ. Wales).

Explanation of Plate 18, 48

Fig. 1, car., dors. (**KUMIP 1,084,567,** 500μm long); fig. 2, car. vent. (**KUMIP 1,084,568,** 500μm long). Figs. 3, 4, RV (**KUMIP 1,084,566,** 480μm long): fig. 3, ant. hinge element; fig. 4, post. hinge element. Figs. 5, 6, LV (**KUMIP 1,084,566,** 480μm long): fig. 5, ant. hinge element; fig. 6, post. hinge element.
Scale A (100μm; ×130), figs. 1, 2; scale B (20μm; ×540), figs. 3–6.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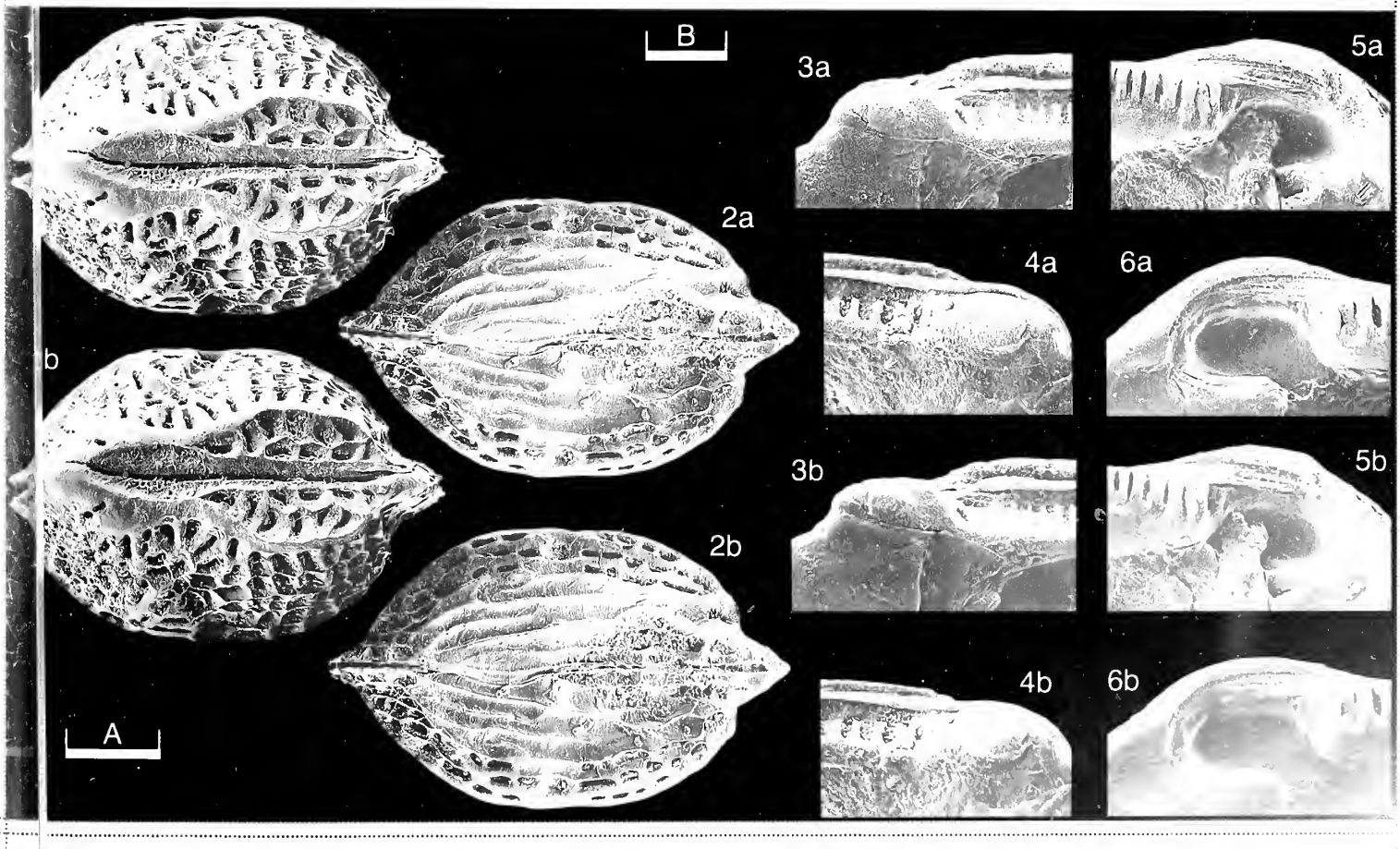
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595.337.14 (119.9) (493 : 161.004.51+420 : 161.001.52) : 551.312.3+551.313.1

ON *CYTHEROMORPHA FUSCATA* (BRADY)

by Ian Boomer & David J. Horne
(University of East Anglia, Norwich & Thames Polytechnic, London)

Genus *CYTHEROMORPHA* Hirschmann, 1909
Type species (subsequent designation by Sars, 1925): *Cythere fuscata* Brady, 1869
(=*Cytheromorpha albula* Hirschmann, 1909).

1909 *Cytheromorpha* gen. nov., N. Hirschmann, *Meddn Soc. Fauna Flora fenn.*, **35**, 290–292.

Diagnosis: Carapace small, medium or large (300–750 μm long), subquadrate to subreniform in lateral view; broadly rounded anterior margin with a narrow marginal rim; dorsal and ventral margins converging posteriorly to a truncate posterior margin. Evenly inflated in dorsal view, tapering anteriorly and somewhat truncated posteriorly. Pitted or reticulate; sometimes with a post-eroventral alar protuberance in each valve. Dimorphic, male more elongate than female. Hinge gongylodont, with two approximately equal-sized posterior teeth in the LV and a smooth median element. Marginal zone relatively broad with a conspicuous anterior vestibulum; marginal pore canals simple, few (10–20 anteriorly). Four adductor muscle-scars in a vertical row, frontal scar tick-shaped, sometimes with a small, round scar above and in front; fulcral point prominent.

Antennula with six stout, articulated podomeres bearing strong chelate setae. Antennal endopodite with four podomeres and two terminal chelate setae; exopodite (spinneret seta) two-jointed. Branchial plate on mandible palp with 2–4 setae. Branchial plate on maxillula without any reflexed setae. Legs slender; setal formulae: (1+1:2:1), (1+1:1:1), 1+1:1:1). Furca with two setae.

Explanation of Plate 18, 50

Figs. 1, 3, ♂ (lectotype, **1.58.27,** 680 μm long): fig. 1, LV ext. lat.; fig. 3, RV ext. lat; fig. 2, ♀ car. l. lat. (paralectotype, **1.58.28,** 540 μm long). Scale A (100 μm; ×100), figs. 1–3.

Remarks: *Cytheromorpha* is externally similar to and often found in association with the genus *Leptocythere*, which differs in having an entomodont hinge and branching marginal pore canals. For detailed discussion of the taxonomy, ecology and distribution of the genus, see J. W. Neale & L. D. Delorme, *Revta esp. Micropaleont.*, **17**, 41–64, 1985.

Cytheromorpha fuscata (Brady, 1869)

1869 *Cythere fuscata* sp. nov. G. S. Brady, *Ann. Mag. nat. Hist.*, (ser. 4), **3**, 47, pl. 7, figs. 5–8.
1869 *Cythere drammensis* sp. nov. G. O. Sars, *Undersøgelser over Christianiafjordens Dybvandsfauna*, J. Dahl, Christiania, 56.
1909 *Cytheromorpha albula* sp. nov. N. Hirschmann, *Meddn Soc. Fauna Flora fenn.*, **35**, 290–292, figs. 7–8.
1925 *Cytheromorhpa fuscata* (Brady); G. O. Sars, *An account of the Crustacea of Norway*, **9**, *Ostracoda*, parts 11–12, 177–178, pl. 81.

Lectotype: Here designated: Hancock Museum, Newcastle-upon-Tyne, no. **1.58.27;** ♂ carapace (separated into RV and LV).

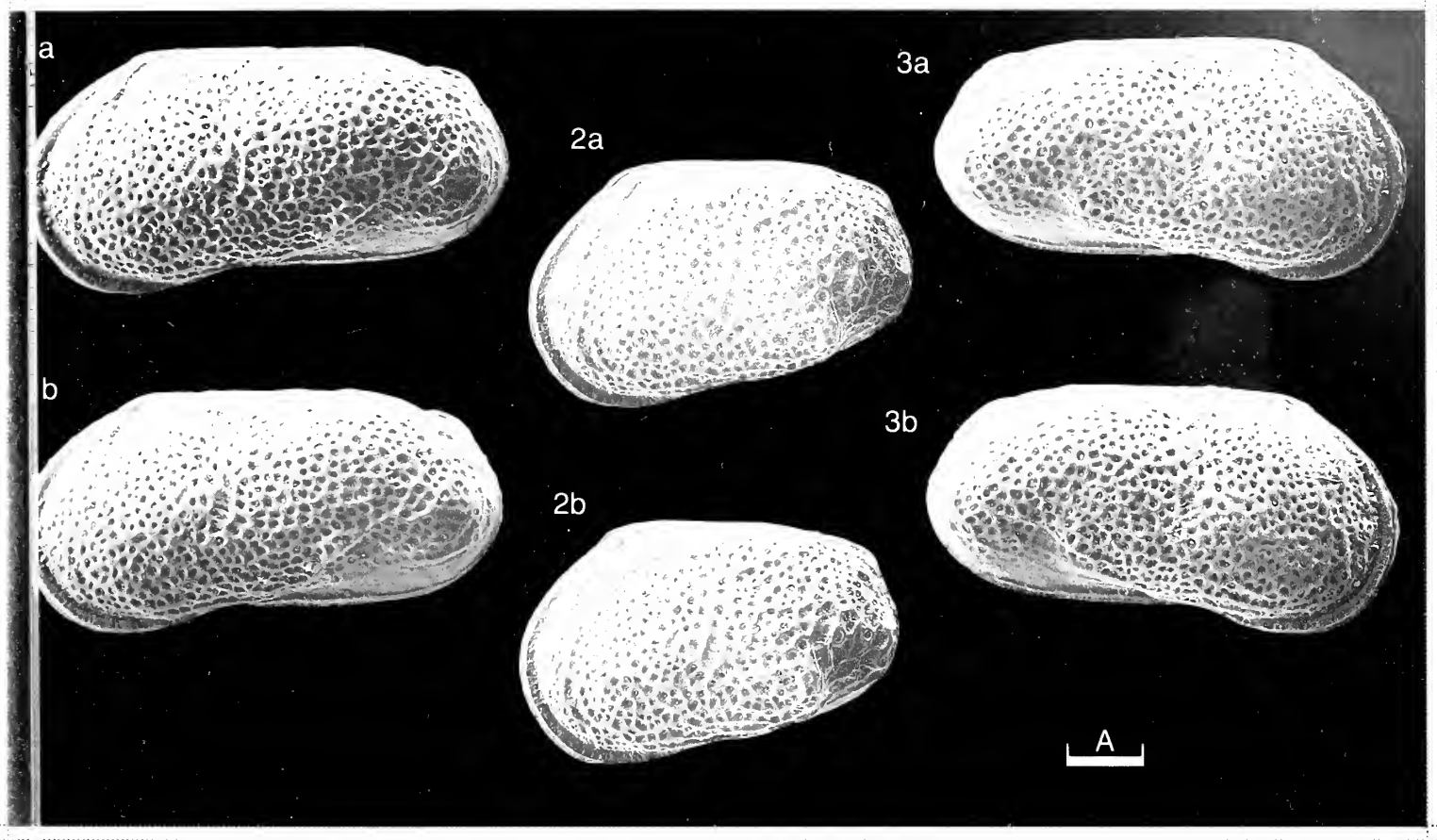
(Paralectotype: no. **1.58.28;** ♀ carapace).

Type locality: River Scheldt, Belgium (approx. lat. 51°15′N, long. 4°20′E). Recent, brackish/freshwater.

Figured specimens: Hancock Museum nos. **1.58.27** (lectotype, ♂; LV: Pl. **18,** 50, fig. 1; Pl. **18,** 52, fig. 3; RV: Pl. **18,** 50, fig. 3; Pl. **18,** 52, fig. 1), **1.58.28** (paralectotype, ♀ car.: Pl. **18,** 50, fig. 2; Pl. **18,** 52, figs. 2, 4). British Museum (Nat. Hist.) nos. **1991.3** (♂ RV: Pl. **18,** 54, fig. 2), **1991.4** (juv.–1 ♀ car.: Pl. **18,** 54, fig. 4), **1991.5** (♂ LV: Pl. **18,** 54, fig. 6), **1991.6** (♀ RV; Pl. **18,** 54, fig. 1), **1991.7** (juv.–1 ♂ car.: Pl. **18,** 54, fig. 3), **1991.8** (♀ LV: Pl. **18,** 54, fig. 5), **1991.9** (♀ RV: Pl. **18,** 56, figs. 1, 5), **1991.10** (♂ LV: Pl. **18,** 56, figs. 3, 6), **1991.11** (♀ car.: Pl. **18,** 56, fig. 2), **1991.12** (♂ car.: Pl. **18,** 56, fig. 4), **1991.194** (♂ appendages: Text-fig. 2). The holotype and paratype were taken from slide no. **2.04.02** in the G. S. Brady Collection at the Hancock Museum, Newcastle-upon-Tyne, on which two ♂ carapaces still remain. A further 10 ♀ and 5 ♂ syntypic carapaces are on faunal slide no. **2.11.19.** Both are from the type locality. The Brit. Mus. (Nat. Hist.) specimens were all collected alive in 1990 by Ian Boomer from just below water level on the river bank between Heigham Sound and Martham Broad, Norfolk (approx. lat. 52°43′N, long. 01°36′E, Nat. Grid Ref. TG 4395 1960); freshwater with brackish incursions on spring tides.

Explanation of Plate 18, 52

Figs. 1, 3, ♂ (lectotype, **1.58.27,** 680 μm long): fig. 1, RV int. lat.; fig. 3, LV int. lat; figs. 2, 4, ♀ car. (paralectotype, **1.58.28,** 540 μm long): fig. 2, vent.; fig. 4, dors. Scale A (100 μm; ×100), figs. 1–4.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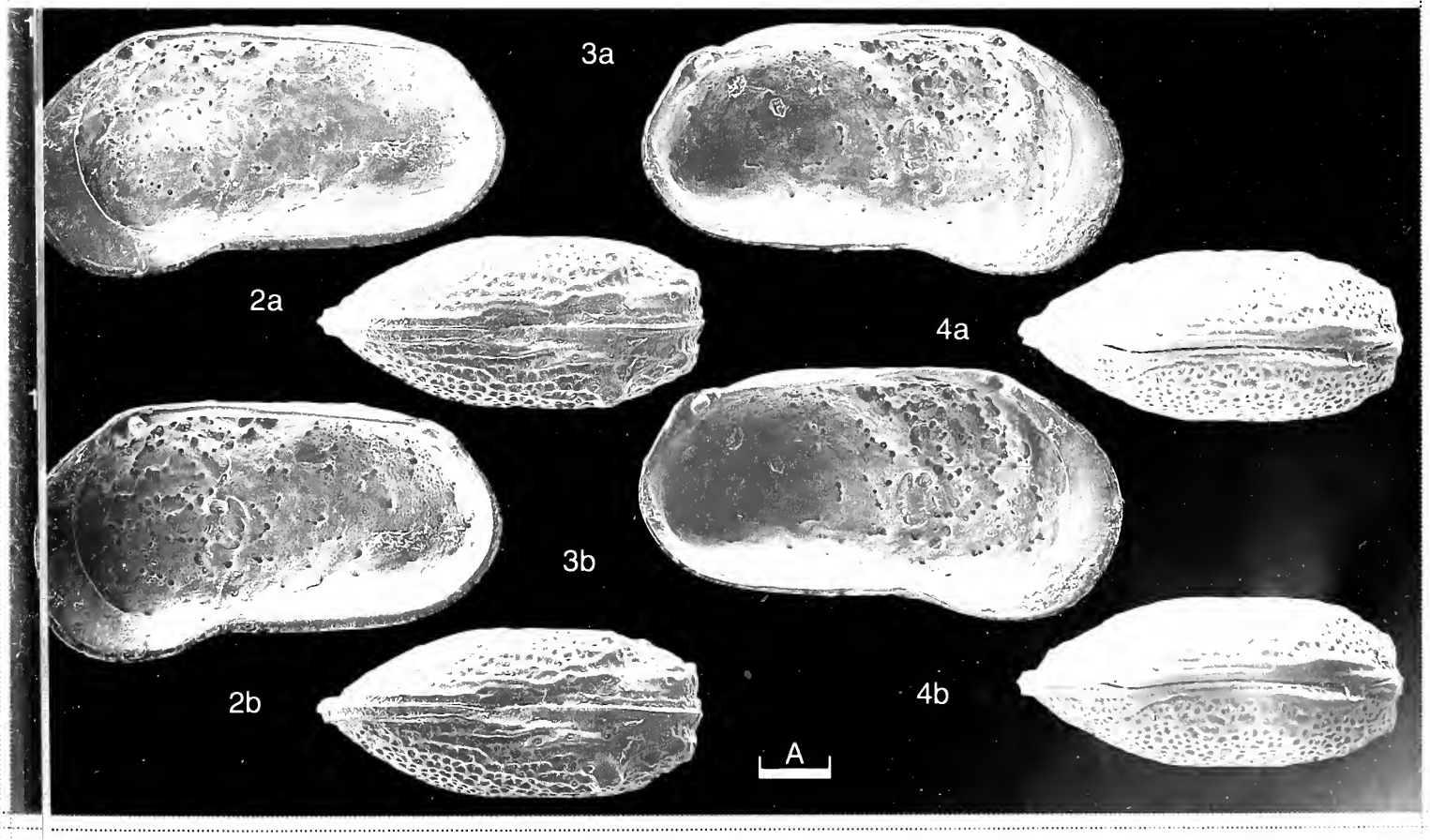
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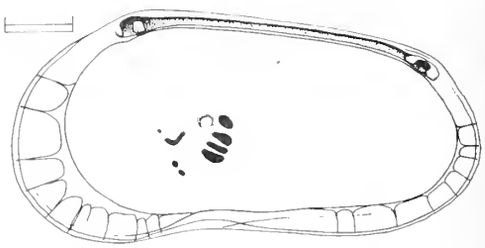
A

Diagnosis: Carapace medium to large (480–750 μm long), strongly pitted with small, rounded fossae. 8–10 anterior marginal pore canals. Sexual dimorphism very conspicuous: male longer and more inflated posteriorly than female; female with a small, knob-like posteroventral alar protuberance in each valve, male with a compressed, smooth area behind a weak swelling in the same position.

Remarks: Although extant populations were recorded from East Anglia in the last century (G. S. Brady & D. Robertson, *Ann. Mag. nat. Hist.* (ser. 4), **6,** 1–33, 1870), none of the specimens remaining in Brady's collection contain any appendages and the species has not subsequently been reported living in Britain until now. We have found it alive in only one locality, although valves and carapaces have been obtained in brackish/estuarine locations on the Rivers Yare, Bure and Waveney.

Distribution: Pleistocene to Recent. Fresh to brackish water (0.5–20‰) in Europe, Scandinavia, Canada and the U.S.A. For further details of distribution and ecology see Neale & Delorme (*op. cit.*).



Text-figure 1: ♂ RV int. lat., seen in transmitted light (based on study of several specimens). Scale bar = 100μm.

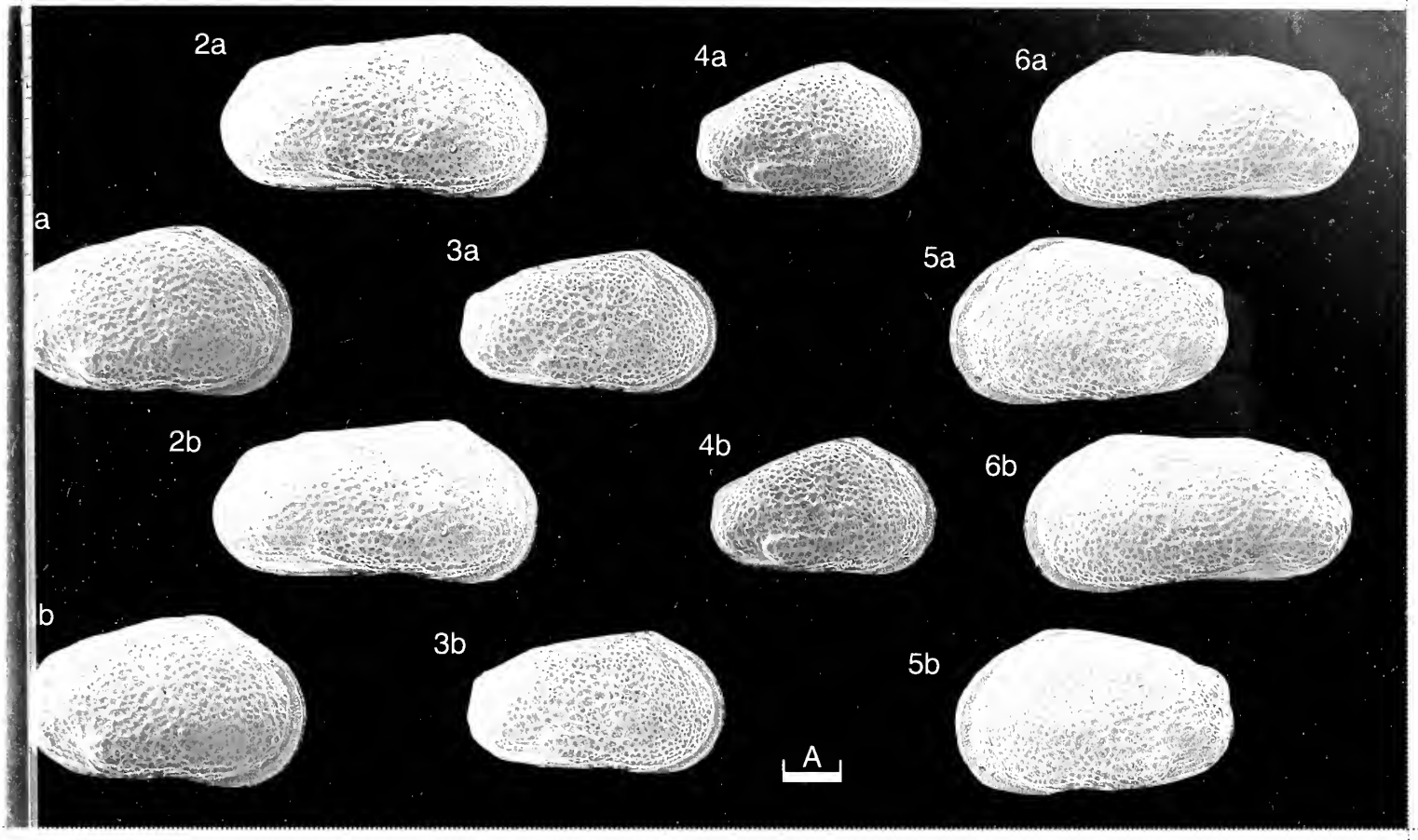
Explanation of Plate 18, 54

Fig. 1, ♀ RV ext. lat. (**1991.6,** 551 μm long); fig. 2, ♂ RV ext. lat (**1991.3,** 647 μm long); fig. 3, juv.–1 ♂ car. rt. lat. (**1991.7,** 514 μm long); fig. 4, juv.–1 ♀ car. rt. lat. (**1991.4,** 444 μm long); fig. 5, ♀ LV ext. lat. (**1991.8,** 551 μm long); fig. 6, ♂ LV ext. lat. (**1991.5,** 667 μm long).
Scale A (100 μm; ×70), figs. 1–6.

Text-figure 2: ♂ appendages (**1991.194**); a, antennula; b, antenna; c, mandible; d, maxillula; e, first leg; f, second leg; g, third leg; h, copulatory appendage. Scale bar = 100 μm.

Explanation of Plate 18, 56

Figs. 1, 5, ♀ RV (**1991.9,** 551 μm long): fig. 1, int. lat.; fig. 5, hinge; fig. 2, ♀ car. dors (**1991.11,** 538 μm long); figs. 3, 6, ♂ LV (**1991.10,** 667 μm long): fig. 3, int. lat.; fig. 6, hinge; fig. 4, ♂ car. dors. (**1991.12,** 667 μm long).
Scale A (100 μm; ×85), figs. 1, 3; scale B (100 μm; ×70), figs. 2, 4; scale C (50 μm; ×180), figs. 5, 6.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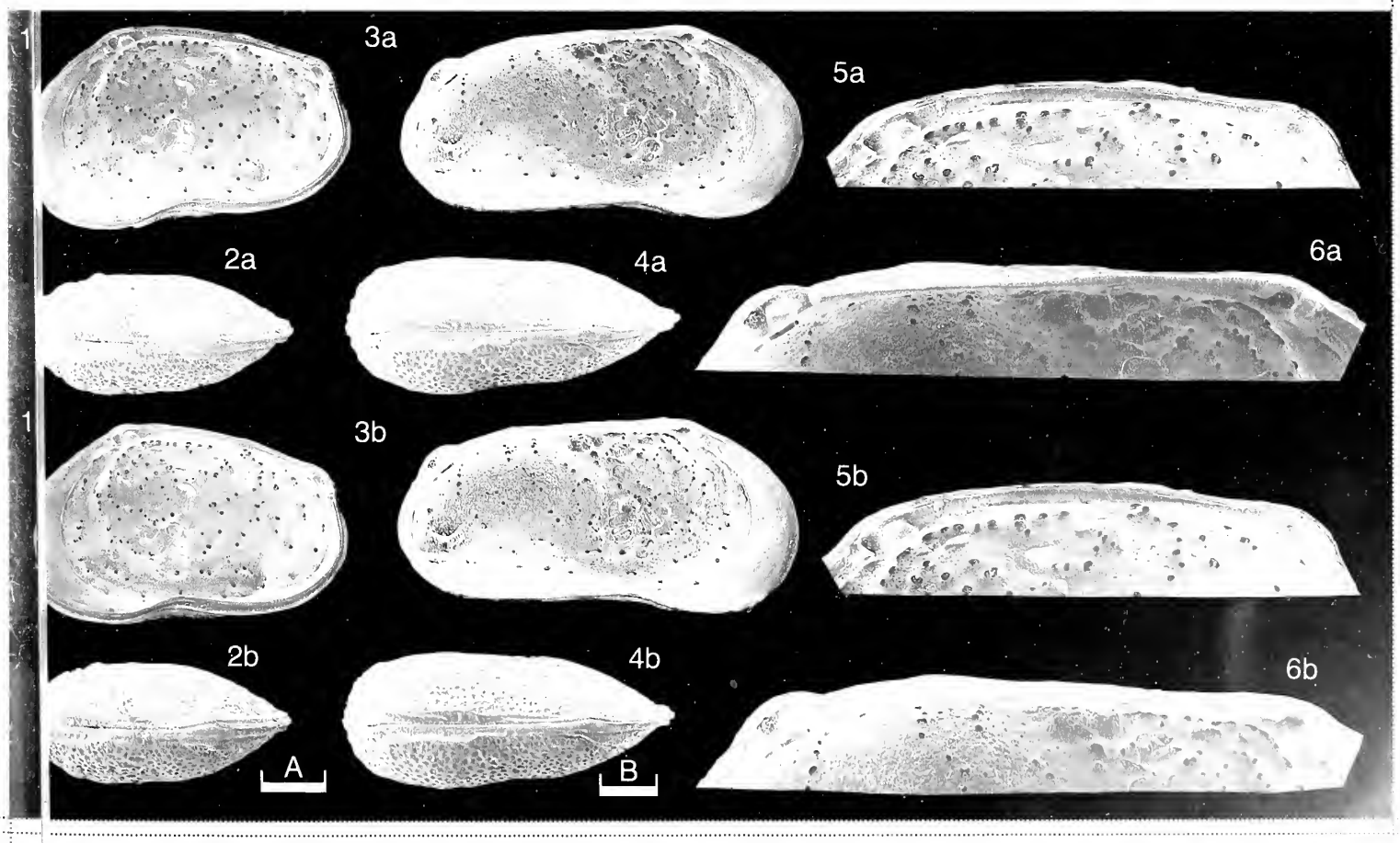
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Stereo-Atlas of Ostracod Shells 18 (14) 57–60 (**1991**)
595.337.14 (119.9) (265.7 : 163.171.45) : 551.351

ON *VITJASIELLA FEROX* (HORNIBROOK)

by Michael A. Ayress
(Department of Geology, University of Otago, Dunedin, New Zealand
(Present address: *Department of Geology, The Australian National University, Canberra))*

Vitjasiella ferox (Hornibrook, 1953)

1953 *Bythocythere ferox* sp. nov., N. de B. Hornibrook, *Trans. R. Soc. N.Z.*, **81**, 307, text-fig. 2.1.

Holotype: Micropalaeontology Section, DSIR Geology & Geophysics, Lower Hutt, New Zealand no. **TO1121/1;** RV.

Type locality: Road cutting at Pukeuri, N E Otago, South Island, New Zealand; approx. lat. 45°03′S, long. 171°02′E. Originally referred to the "Awamoan" and dated as late Oligocene by.Hornibrook (*op. cit.*); now placed in the Altonian Stage and dated as early Miocene.

Figured specimens: Geology Museum, University of Otago, Dunedin, New Zealand nos. **OU 39975** (LV: Pl. **18,** 58, figs. 1, 3, 4; Pl. **18,** 60, fig. 3), **OU 39976** (RV: Pl. **18,** 58, figs. 2, 5; Pl. **18,** 60, figs. 1, 2; text-fig. 1). From off Oamaru, east coast of South Island, New Zealand, approx. lat. 45°06′S, long. 171°05′E; Recent, from 68m depth.

Diagnosis: A species of *Vitjasiella* with prominent clavate spines bordering anterior and postero-ventral margins and along extremity of ventro-lateral inflation. Hinge merodont with lobate anterior and posterior terminal elements and a median element slightly expanded and crenulate distally.

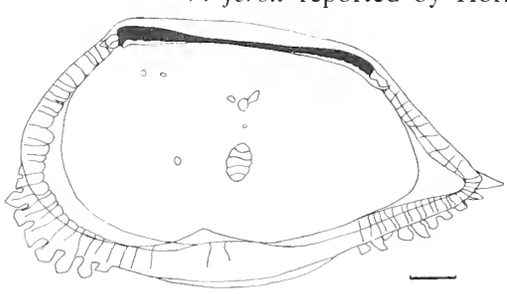
Explanation of Plate 18, 58

Figs. 1, 3, 4, LV (**OU 39975,** 950 μm long): fig. 1, ext. lat.; fig. 3, ext. dors.; fig. 4, int. lat. Figs. 2, 5, RV (**OU 39976,** 970 μm long): fig. 2, ext. lat.; fig. 5, int. lat.
Scale A (200 μm; ×110), figs. 1–5.

Remarks: Hornibrook (1953, *op. cit.*) illustrated, by camera lucida drawing, only an external view of a right valve. The hinge, in addition to Hornibrook's observations, has a bilobate posterior terminal element and a smaller arcuate anterior terminal element, also the median element is slightly crenulate distally. These features, together with the spinose valve borders, serve to distinguish this species from the type species *Vitjasiella belyaevi* Schornikov (1976, *Abh. Verh. naturw. Ver. Hamburg* (n.s.), **18/19** suppl., 252, text-figs. 3–5), which possesses a smooth lophodont hinge. A similar hinge-type to that of *V. ferox* is also present in *Vitjasiella fenestrata* (Brady) (1880, *Rep. scient. Results Voy. Challenger* (Zool.) **1** (3), 139, pl. 34, fig. 6 = *Cytheropteron fenestratum* Brady; see also H. S. Puri & N. C. Hulings, 1976, *Bull. Br. Mus. nat. Hist.* (Zool.), **29,** 306, pl. 23, fig. 18, pl. 24, figs. 1–6).

Recent specimens, as illustrated here, differ from the fossil type specimen very slightly in their more pointed posterior outline and also lack spines on the short dorsal ridge. A third form of *V. ferox*, which possesses two rows of ventro-lateral spines, occurs in the Waitakian (latest Oligocene – earliest Miocene) to Altonian (early Miocene) stages of New Zealand.

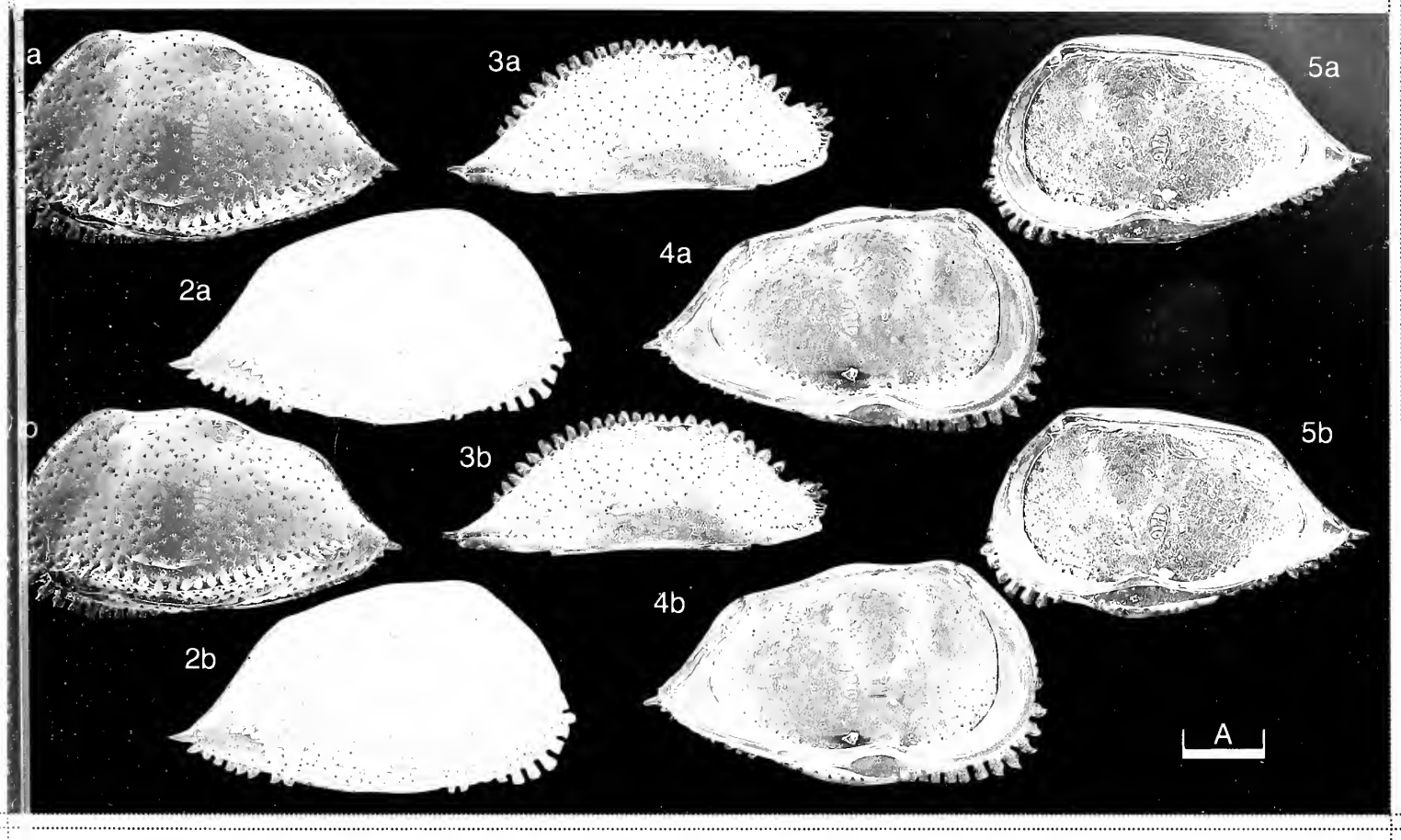
Distribution: This Recent record extends the Runangan (latest Eocene) to Castlecliffian (late Pliocene) range of *V. ferox* reported by Hornibrook (1953).



Text-fig. 1, RV, internal features observed in transmitted light (**OU 39976**, 970 μm long). Scale = 100 μm.

Explanation of Plate 18, 60

Figs. 1, 2, RV (**OU 39976**), anterior and posterior hinge detail, respectively. Fig. 3, LV (**OU 39975**), posterior hinge detail.
Scale A (50 μm; ×590), fig. 1; scale B (50 μm; ×440); scale C (50 μm; ×500), fig. 3.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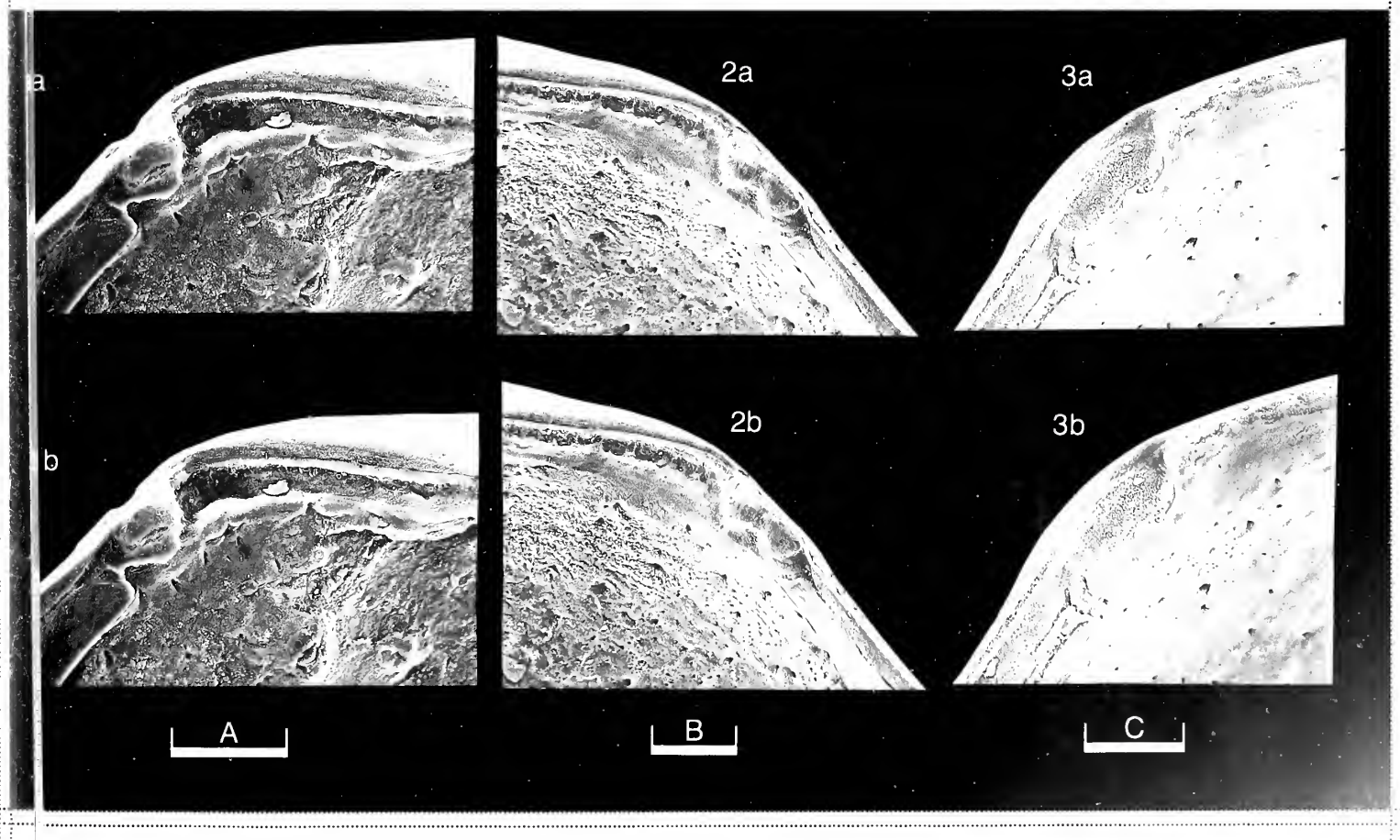
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595.337.3 (116.33) (430 : 161.013.54) : 551.351+552.55

ON *PUNCIA LEVIS* HERRIG

by Ekkehard R. Herrig
(University of Greifswald, Germany)

Puncia levis Herrig, 1988

1988 *Puncia levis* sp. nov., E. Herrig, *Geschiebekde. Aktuell*, **4,** 34, figs. 1, 2.

Holotype: Sektion Geologische Wissenschaften, Universität Greifswald no. **SGWG 9287/1;** left valve. [Paratypes: **SGWG 28290/1,** left valve; **SGWG 28290/2,** right valve].

Type locality: Fahrnitz beach, coast of Jasmund, Island of Rügen (Baltic Sea), Germany; lat. 54°33′N, long. 13°40′E. Flint erratic boulder. Late Maastrichtian.

Figured specimens: Sektion Geologische Wissenschaften, Universität Greifswald nos (**SGWG**) **28290/1** (LV: Pl. **18,** 62, figs. 1, 2; Pl. **18,** 64, fig. 2) and **28290/2** (RV: Pl. **18,** 64, fig. 1).

Both paratypes from flint erratic boulders of Upper Cretaceous age from Germany. No. **SGWG 28290/1** is from the type locality; **28290/2** is from the beach at Vierow, Greifswald Bay (Baltic Sea); lat. 54°08′N. long. 13°35′E.

Diagnosis: Adult valves elongate, 410–460 μm long. Very weak sulcus in central part of valve, otherwise valve lateral surface is gently curved. Velum-like adventral ridge extends between cardinal corners, is best developed and is of reasonable width below mid height; its upper surface has a ridge with tiny, closely spaced processes. Valve lateral surfaces are finely reticulate to punctate.

Explanation of Plate 18, 62

Figs. 1, 2, LV (paratype, **SGWG 28290/1,** 410 μm long): fig. 1, ext. lat.; fig. 2, int. lat.
Scale A (100 μm; ×200), figs. 1, 2.

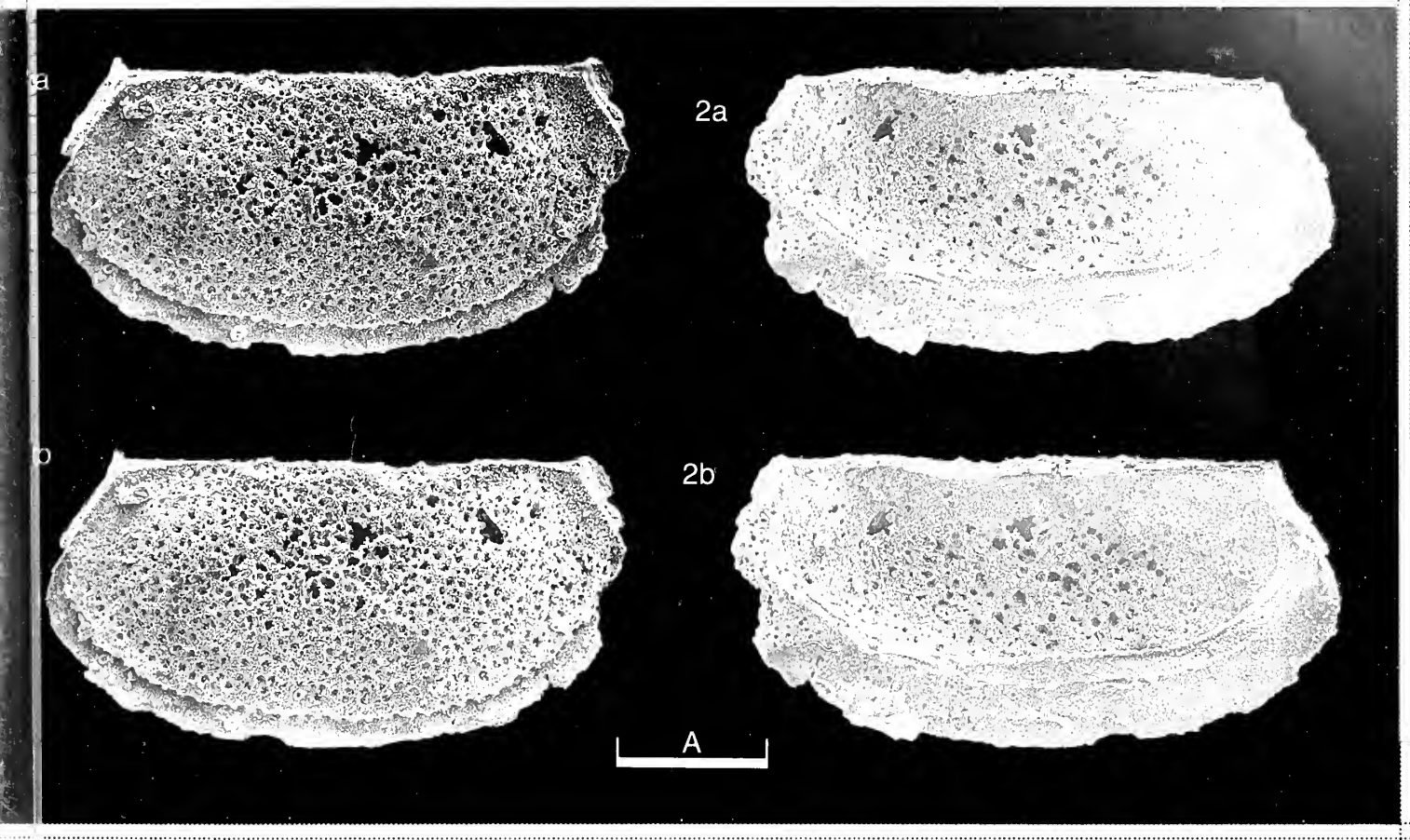
Remarks: Detailed study of the holotype and newly-found additional material of *P. levis*, here illustrated, reveals fine, dense ornament on all lateral parts of the valve except the velum. Reticulation is clearly seen (Pl. **18,** 62, fig. 1); a tendency towards developing punctation (Pl. **18,** 64, fig. 1) may reflect factors of preservation.

This species is similar to *P. goodwoodensis* Hornibrook (N. de B. Hornibrook, *Micropaleontology*, **9,** 319, text-figs. 1, 2, 1963) from the Lower Miocene of New Zealand, but differs in the presence of a ridge at the base of its velum. *Puncia* Hornibrook (1949, *Trans. R. Soc. N.Z.*, **77,** 470) is type genus of the Punciidae Hornibrook, 1949. Like the punciid *Manawa* Hornibrook (1949, *ibid.*, 470), for which soft-parts have recently been described in detail (K. M. Swanson, *Cour. ForschInst. Senckenburg*, **113,** 11–20, 235–249, 1989), *Puncia* probably belongs to platycope stock.

Distribution: Upper Cretaceous of the north German – central Baltic area; flint erratice boulders originally from late Maastrichtian chalk of the Danish-Polish furrow.

Explanation of Plate 18, 64

Fig. 1, RV, ext. lat. (paratype, **SGWG 28290/2,** 450 μm long); fig. 2, LV, ext. lat., detail showing pitted surface (paratype, **SGWG 28290/1**).
Scale A (100 μm; ×200), fig. 1; scale B (10 μm; ×1250), fig. 2.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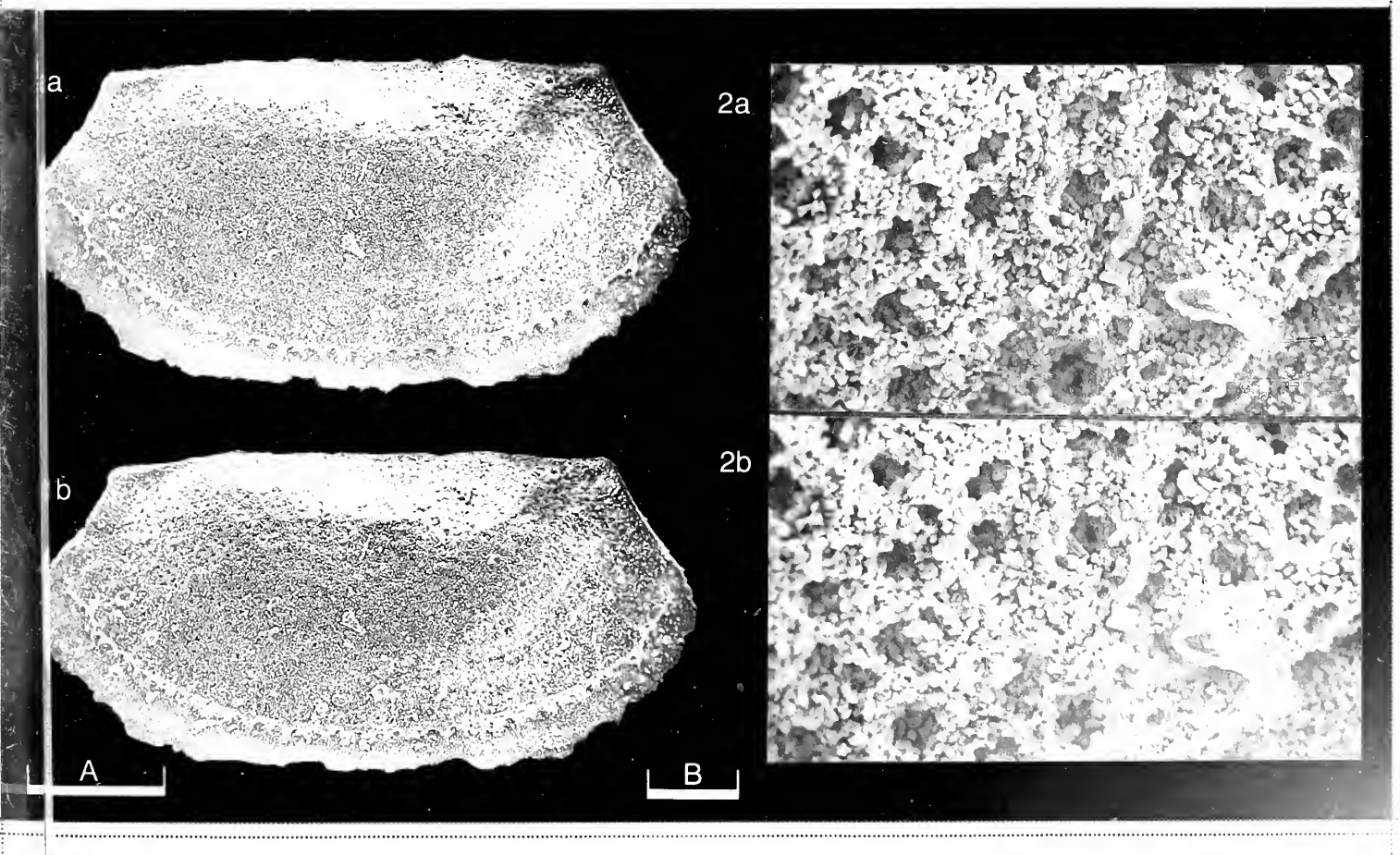
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Stereo-Atlas of Ostracod Shells 18 (16) 65–68 (**1991**)
595.330 (113.23) (943 : 163.139.22) : 551.35+552.64

ON *CAPRICAMBRIA CORNUCOPIAE* GEN. ET SP. NOV.

by Ingelore C. U. Hinz
(University of Bonn, Germany)

Genus *CAPRICAMBRIA* gen. nov.
Type species: *Capricambria cornucopiae* sp. nov.

Derivation of name: From Latin *capra*, a goat + *Cambria*; referring to the large, lateral horn-like spines and the Cambrian occurrence, respectively. Gender, feminine.

Diagnosis: Bradoriid with carapace subamplete, straight hinge line and flattened free marginal area. Valves symmetrical; each with two large, cornutiform spines and a steeply elevated comarginal ridge which parallels valve margin. Outer surface of valve reticulate.

Capricambria cornucopiae sp. nov.

Holotype: Institut für Paläontologie, University of Bonn, Germany, no. **UB 209;** carapace.

Type locality: 1km north of Mt. Murray, Queensland, Australia (lat. 21°48.8′S, long. 139°58.5′E); phosphorite deposits of the Duchess Region; *T. gibbus* Zone, Middle Cambrian.

Derivation of name: From Latin *cornu copiae*, the goat's horn or horn of plenty; alluding to the horn-like lateral spines. Used as a noun in apposition.

Figured specimen: University of Bonn, Germany, no. **UB 209** (holotype, car.: Pl. **18,** 66, figs. 1–3, Pl. **18,** 68, figs. 1, 2). From the type locality.

Explanation of Plate 18, 66

Figs. 1–3, crumpled car. (holotype, **UB 209,** 670μm long): fig. 1, ext. lt.(?) lat.; fig. 2, ext. ant.; fig. 3, ext. post. Scale A (100μm; ×105), figs. 1, 3; scale B (100μm; ×120), fig. 2.

Diagnosis: Carapace equivalved and almost semicircular in outline; amplete. Dorsal corners form approximate right angles. Hinge line straight and simple, with distinctly separate valves except for a very short portion at either end; dorsum rather narrow. Maximum length of valve at about mid height. Area along free margin flattened and set off from rest of valve by a steep ridge that runs from anterodorsal to posteroventral region; ridge gradually decreases in height and terminates close to a well developed vertical spine. Adjacent to the ridge and at about the same height, a smaller, anterior spine is developed. Except for the spines and ridge the valve's outer surface is reticulate, consisting of irregular polygons. Marginally, corners of polygons may be the sites of minute nodes. Spines show irregular annulations (possibly caused by shrinkage?).

Remarks: Among Cambrian bradoriids, the presence of well developed spines is rather rare. If spines are developed at all, they are generally situated in the dorsal or ventral area. The genus *Monasterium* Fleming (1973, *Publs geol. Surv. Qd.*, **356,** 8), for example, has a long anterodorsal spine on either valve, but because of its delicate nature it is usually broken. The subgenus *Kunmingella* (*Spinokunmingella*) Huo & Shu (1985, *Cambrian Bradoriida of South China*, Northwest Univ. Publ. House, Xian, 113) is supposed to have a well developed posteriorly directed ventral spine.

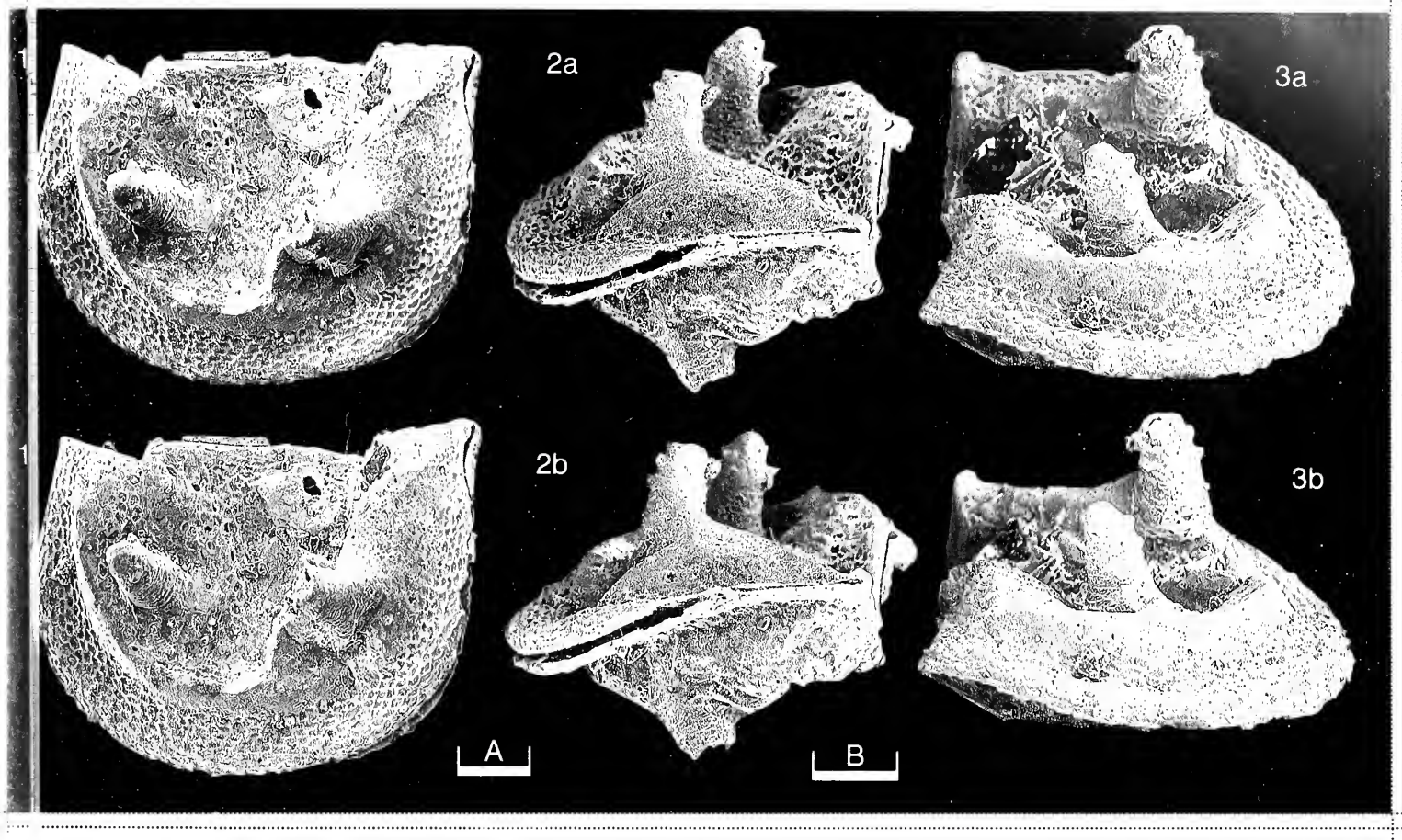
Another character of *Capricambria* is its reticulate outer surface, a feature which it has in common with, for example, *Monasterium* and *Zepaera* Fleming (1973, *op. cit.*), *Polycostalis* Shu (1990, *Cambrian and Lower Ordovician Bradoriida from Zhejiang, Hunan and Shaanxi Provinces*, Chinese Univ. of Geology, Beijing, 63) and *Flemingopsis* Jones & McKenzie (1981, *Alcheringa,* **5,** 310). A common character between *Flemingopsis* and *Capricambria* is the flattened free marginal area and the highly convex rest of the valve. But, in contrast to the more rounded elevation in *Flemingopsis, Capricambria* has a steep ridge.

The virtually unbroken, crumpled nature of the carapace of *Capricambria* might argue for a flexible, at most slightly mineralised wall substance. Similar preservation has been observed in a great many bradoriid specimens, particularly of the genus *Monasterium*. Due to the crumpled condition of the carapace, the suggested orientation in *Capricambria* is somewhat questionable.

Distribution: Known only from the type locality.

Explanation of Plate 18, 68

Figs. 1, 2, crumpled car. (holotype, **UB 209**): fig. 1, ext. vent.; fig. 2, ext. dors. Scale A (100μm; ×140), figs. 1, 2.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Stereo-Atlas of Ostracod Shells: Vol. 18, Part 1

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A Stereo-Atlas of Ostracod Shells

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and J. E. Whittaker

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Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by only one page of text. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to one of the Editors. All contributions submitted for possible publication in the *Stereo-Atlas of Ostracod Shells* are reviewed by an appropriate international specialist.

The front cover shows a male left valve and appendages, internal view, of *Limnocythere borisi borisi* Martens, 1990. Paratype, K.B.I.N., Brussels, OC.1406. From Lake Abijata, Ethiopia. Photographed by K. Martens and J. Cillis.

595.33.330 (113.23) (943 : 163.139.22) : 551.35 + 552.64

ON *ULOPSIS ULULA* HINZ gen. et. sp. nov.

by Ingelore C.U. Hinz
(University of Bonn, Germany)

Genus *ULOPSIS* gen. nov.
Type-species: *Ulopsis ulula* sp. nov.

Derivation of name: Latin *ulula*, owl, and *-opsis*, like; gender feminine.

Diagnosis: Hesslandonid with nearly equivalved, subamplete to slightly postplete carapace. Valve outline almost semicircular; "hinge line" straight, except near cardinal corners. Carapace very inflated. Maximum length above mid-height. Interdorsum (= dorsum and dorsal bar of Müller 1964, 1982 respectively) fairly broad, apparently demarcated by simple bends or breaks ("hinges"), forms acroidal processes. Free margin equally convex, free marginal area flattened and distinctly set off from inflated rest of valve. Large oval lobe just in front of mid-dorsal area, separated from much smaller, curved anterodorsal lobe by shallow sulcus. Inclined, elongate lobe occurs behind approximately mid-dorsal, triangular depression. Posterodosal area has a subdued node, below which another, much weaker node may be developed.

Remarks: In larger instars the oval, anterior lobe is laterally inflated to beyond the lower half of the valve, whereas the oblique, elongate lobe remains relatively small. The smooth outer surface of the valve may be crumpled, thus indicating a certain flexibility of the shell.

With its distinct interdorsum *Ulopsis* belongs to hesslandonids that are characterised by a "double hinge" (Müller, K., *Neus Jb. Geol. Paläont. Abh.*, **121**, 1964; Müller, K. *in*: Bate, R. H. *et al.*, *Fossil and Recent Ostracods*, 1982, Ellis Horwood, Chichester). It is uncertain whether or not *Ulopsis* has adont (nullidont) hinges or only bends in the shell. Carapaces with dorsal bends indicate a fairly flexible shell material; however, a distinct separation into valves results from increased mineralisation which presumably made the shell more brittle. Both

Explanation of Plate 18, 70

Figs. 1, 2, car. (holotype, **CPC 23/S4**, 0.80 mm long); fig. 1, ext. lt. lat.; fig. 2, ext. dors. Fig. 3, incomplete car. (**CPC 23/S3**, 1.34 mm long), ext. dors. Scale A (100 μm; ×75), figs. 1, 2; scale B (250 μm; ×60), fig. 3.

developments are considered not to differ fundamentally from each other; they may be due to evolutionary processes or may represent ecological adaptations. In any event the presence of a broad interdorsum seems to be quite a primitive character, possibly resulting from a minor lateral compression of the ostracod body at an early stage of evolution. It is presently uncertain whether hesslandonids are intermediate in the development from univalved dabashanellids to "normal" bivalved forms or whether they represent a special off-shoot in the early evolution of ostracods.

In its basic lobation, having antero- and posterodorsal lobes, *Ulopsis* is comparable to the Palaeozoic Binodicopa. There is also superficial similarity to *Kunmingelloides* Shu, 1990 (*Cambrian and Lower Ordovician Bradoriida from Zhejiang, Hunan and Shaanxi Provices*, 54, Northwest Univ. Press), whose distinct lobes, located at either end of the shell, might be homologous to the small lobes of *Ulopsis*. However, *Ulopsis* is distinguished by its fairly broad interdorsum, the presence of acroidal processes and by its shape and lobal arrangements.

Soft integument preservation in phosphatocopid ostracods is only known in specimens from Sweden (e.g. Müller 1979, *Lethaia*, **12**, 1–27; 1982) and Great Britain (Hinz 1987, *Palaeontographica*, **198-A**, 59). However, one dorsally broken specimen of *Ulopsis* (Pl. **18**, 70, fig. 3) exposes some relics of its original body. Proper appendages are not recognizable; instead, phosphatized, now crumpled tissue that lined or filled the integument roughly reflects its original position. These structures occur together with hypha-like threads that are quite common in body cavities. These separate phenomena should not be confused.

Ulopsis ulula sp. nov.

Derivation of name: Latin *ulula*, an owl; fancied resemblance of valve in lateral view.

Holotype: Bureau of Mineral Resources, Canberra, no. **CPC 23/S4**; carapace.

Type locality: Rogers Ridge, Queensland, Australia (lat. 21°45,4′S, long. 139°58,8′E); phosphorite deposits of the Duchess Region, *Triplagnostus gibbus* Zone, middle Cambrian.

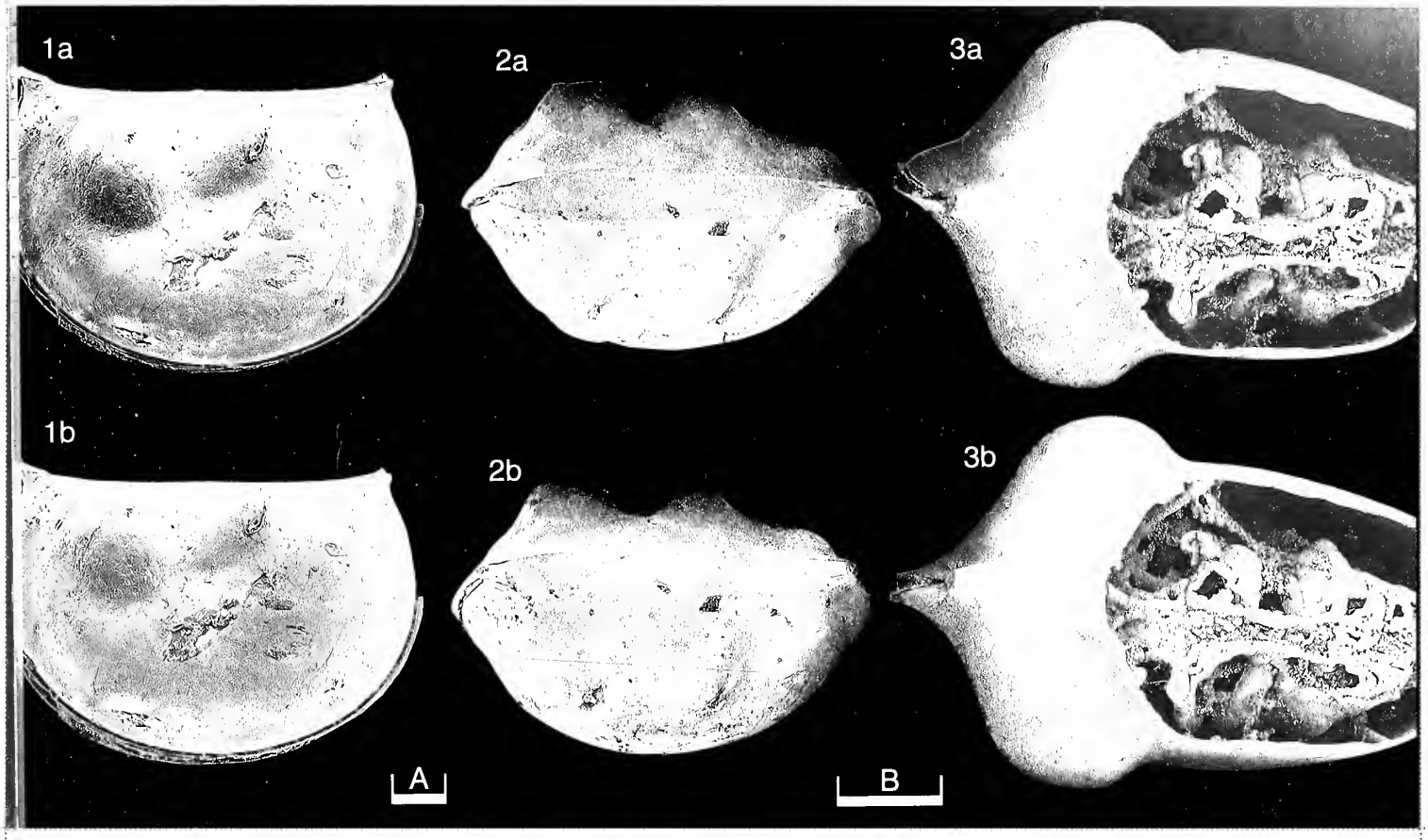
Figured specimens: Bur. Min. Res. nos. **CPC 23/S4** (holotype, car.: Pl. **18**, 70, figs. 1, 2), **CPC 23/S3** (incomplete car.: Pl. **18**, 70, fig. 3), **CPC 23/S5** (crumpled RV: Pl. **18**, 72, fig. 1), **CPC 23/S7** (car.: Pl. **18**, 72, fig. 2) and **CPC 23/S6** (car.: Pl. **18**, 72, fig. 3). All from the type locality.

Diagnosis: As for the genus. *Ulopsis* is currently monotypic.

Distribution: Known only from type locality.

Explanation of Plate 18, 72

Fig. 1, crumpled RV (**CPC 23/S5**, 1.29 mm long), ext. lat.; Fig. 2, car. (**CPC 23/S7**, 1.37 mm long), ext. vent.; Fig. 3 car. (**CPC 23/S6**, 1.22 mm long), ext. ant. Scale A (250 μm; ×50), fig. 1; scale B (100 μm; ×70), fig. 2; scale C (250 μm; ×60), fig. 3.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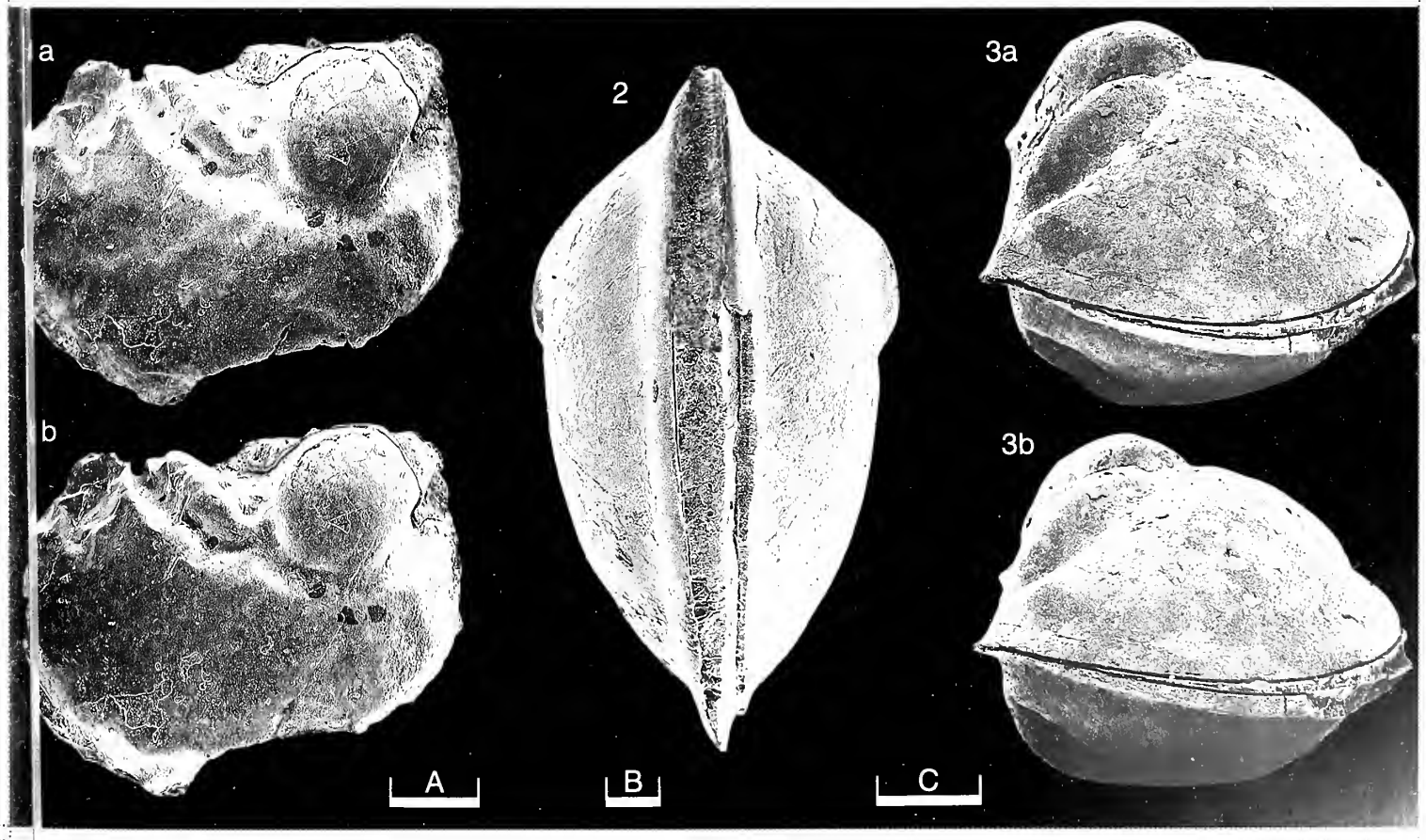
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595.336 (113.51) (761 : 162.88.34 + 87.34): 551.351 + 552.52 + 552.54

ON *MAMMOIDES DORSOSPINOSUS* SOHN

by Christopher P. Dewey & T. Mark Puckett
(Mississippi State University & Alabama Geological Survey, U.S.A.)

Mammoides dorsospinosus Sohn, 1961

1961 *Mammoides dorsospinosa (sic)* sp. nov., I. G. Sohn, *Prof. Pap. U.S. geol. Surv.*, **330-B**, 114, pl. 7, figs. 15, 16.

Holotype: United States National Museum, Washington, U.S.A., no. **USNM 119818**; crushed? juvenile carapace.
[Paratypes, no. **USNM 119819**, 15 specimens].

Type locality: USNM locality no. 1086, Brownwood Shale, Canyon Group, Missourian, Upper Pennsylvanian, Carboniferous; central Texas, U.S.A. Collected by A.R. Loeblich. Loeblich's field notes have been lost and an exact type locality is unknown (Sohn, pers. comm.).

Figured specimens: Dunn-Seiler Museum of Geology, Mississippi State University, U.S.A., nos. **3341-3a** (RV: Pl. **18**, 76, fig. 2), **3341-3b** (RV: Pl. **18**, 76, fig. 1), **3341-3c** (RV: Pl. **18**, 74, fig. 4), **3341-3d** (LV: Pl. **18**, 74, fig. 3), **3341-3e** (RV: Pl. **18**, 74, figs. 1, 2).

3341-3a, **3b** and **3e**, from Dry Creek Quarry, N of Trussville, Alabama, U.S.A., lat. 33° 37′ 30″N, long. 86° 37′ 30″W; grey shale with abundant goniatites and other macrofauna; **3341-3a** and **3b** from 2.9 m and **3341-3e** from 2.2 m above base of unit. Nos. **3341-3c** and **3d** from Henson Creek, S of Barton, Alabama, lat. 34° 40′ N, long. 87° 52′ 28″W; thin bioclastic shaley limestone horizon with bryozoans, crinoid debris, brachiopods and molluscs, 3.95 m above base of section. All from Pride Mountain Formation, Chesterian, Mississippian, Carboniferous.

Explanation of Plate 18, 74

Figs. 1, 2, adult RV (**3341-3e**, 0.85 mm long): fig. 1. ext. lat.; fig. 2. int. lat. Fig. 3, adult LV (**3341-3d**, 0.9 mm long): int. lat. Fig. 4, adult RV (**3341-3c**, 0.95 mm long): int. lat.
Scale A (250 μm; ×60), figs. 1–4.

Diagnosis: Thick, tumid, semicircular, bilobate *Mammoides*. Dorsal margin straight, cardinal angles obtuse. Posterodorsal corner slightly rounded, anterodorsal corner recurved. Ends evenly rounded, maximum curvature of anterior end slightly below midheight; posterior with greater ventral swing, maximum curvature at midheight. Shallow S2 at midlength between posteriorly curved spines of L2 and L3. Ventral lobe confluent with low, ridge-like L1, terminates below L3. Posterior spine at or just above midheight. Surface reticulate. Inner lamella wide, narrows slightly to posterodorsal corner. Tongue and groove hinge.

Remarks: Three species of *Mammoides* Bradfield, 1935 possess a posterior spine at or above midheight: *M. dorsospinosus* Sohn, 1961, *M. longispina* Green, 1963 and *M. bouckaerti* Bless & Massa, 1982. Sohn described *M. dorsospinosus* from crushed specimens collected from the Upper Pennsylvanian of central Texas, U.S.A. and Green (*Bull. Res. Coun. Alb.*, **11**, 72–75, 1963) described *M. longispina* from the Lower Mississippian of Alberta, Canada. The difference between these species is the extreme development of the dorsal and posterior spines in *M. longispina*. *M. bouckaerti*, from the Upper Visean of the Rhadames Basin, Libya (Bless & Massa, *Revue Inst. fr. Pétrole*, **37**, no. 1, 26), differs from both of the other species by its much more circular outline and more closely spaced dorsal spines.

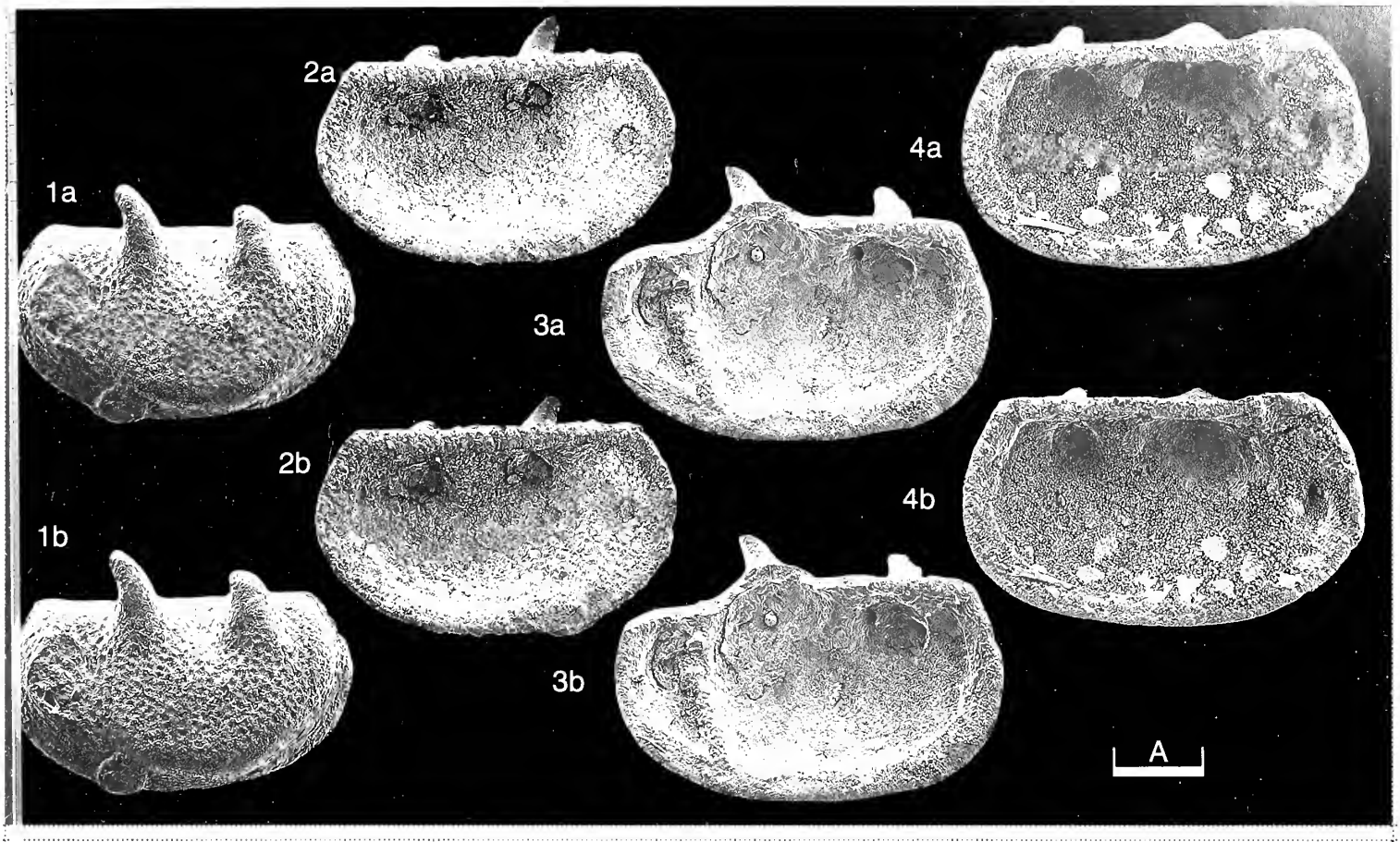
The material described herein shows a wide inner lamella, which has not been described previously for the genus. Shape variations in *M. dorsospinosus* from Alabama may be observed in length : height ratio and the development of the ventral lobe. Shape variations in *Mammoides* have also been noted by Green (1963) through a 400 m interval of the Banff Formation in Alberta and also within individual samples, therefore making it unlikely that the variants represent sexual dimorphs.

Distribution: Brownwood Shale, Canyon Group, Missourian, Upper Pennsylvanian, Central Texas; Pride Mountain Formation, Chesterian, Mississippian, Black Warrior Basin, Alabama, U.S.A.

Acknowledgement: We acknowledge the financial support given by the Donors of the Petroleum Research Fund administered by the American Chemical Society; the Mississippi Mineral Resources Institute and Mississippi State University.

Explanation of Plate 18, 76

Fig. 1, adult RV (**3341-3b**, 0.91 mm long): ext. lat. Fig. 2, adult LV (**3341-3a**, 0.9 mm long): ext. lat. Fig. 3, adult LV (specimen lost, 0.95 mm long): int. lat.
Scale A (250 μm; ×70), figs. 1, 2; scale B (250 μm; ×60), fig. 3.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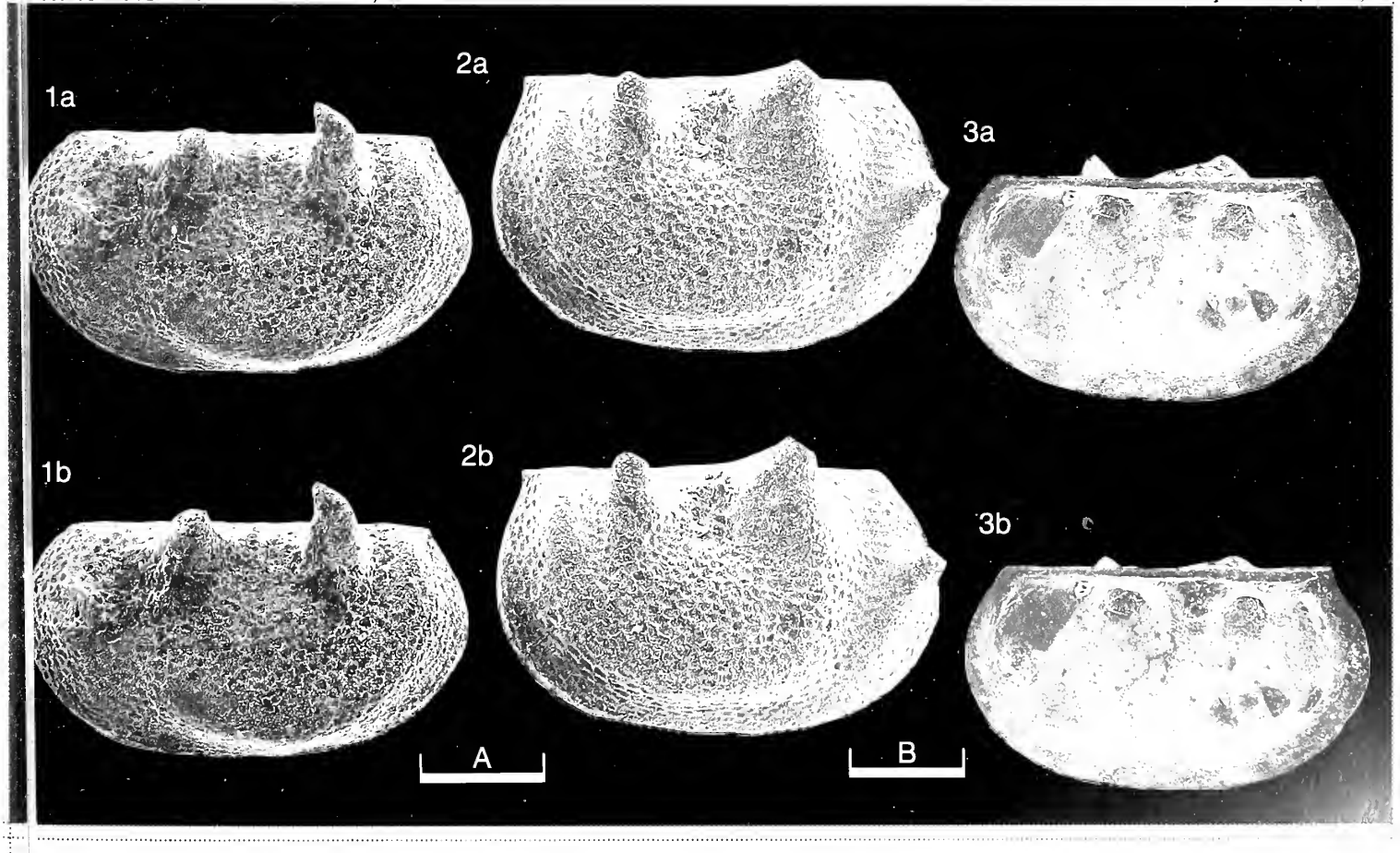
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B

ON *QUJINGSIA NONACULEATA* HANSCH & WANG gen. et sp. nov.

by Wolfgang Hansch & Wang Shang-qi
(University of Greifswald, Germany
& Nanjing Institute of Geology & Palaeontology, People's Republic of China)

Genus *QUJINGSIA* gen. nov.
Type-species: *Qujingsia nonaculeata* sp. nov.

Derivation of name: After Qujing, name for the district of the type locality.

Diagnosis: Small Beyrichiidae with a fused lobation and a low, narrow, flange-like uninterrupted velar structure extending between cardinal corners in both dimorphs. Crumina assimulated within the lobal area, without any distinct striate ornament ventrally. No zygal arch.

Remarks: This genus shows similarity to the Baltoscandian *Bingeria*, an atypical beyrichiine genus, but differs especially in the shape of the crumina and in the lack of striate subcruminal ornament (cf. Martinsson, A., 1962, *Bull. geol. Instn Univ. Uppsala*, **41**). Furthermore, *Qujingsia* lacks a distinct zygal arch. *Qujingsia* can be distinguished from the several subgenera of *Beyrichia* by the cuspidal morphology of its syllobium, its cruminal morphology and the lack of distinct subcruminal (striate) ornament and by its very poor development of lobal ornamental features. The flange-like reduction of the velum in *Qujingsia* indicates relationships to the wellerielliide genera which lack traces of a velar structure (cf. Abushik, A.F. *in*: Abushik *et al.*, *Palaeozoic ostracodes from key sections in the European part of the U.S.S.R.*, 7–133, 1971, Nauka, Moscow).

Explanation of Plate 18, 78

Figs. 1, 3, ♀ car. (holotype, **NIGPAS 115620**, 820 μm long): fig. 1, LV, ext. lat.; fig. 3, RV, ext. lat. Fig. 2, ♀ car., ext. vent. (**NIGPAS 115622**, 880 μm long). Fig. 4, ♀ car., ext. dors. (**NIGPAS 115624**, 850 μm long). Fig. 5, ♂ car., LV, ext. lat. (**NIGPAS 115621**, 890 μm long).

Scale A (200 μm; ×65), figs. 1, 3; scale B (200 μm; ×60), figs. 2, 4, 5.

Qujingsia nonaculeata sp. nov.

Holotype: Nanjing Institute of Geology and Palaeontology, Academia Sinica, People's Republic of China, no. **NIGPAS 115620**, ♀ carapace.

Type locality: Liaojiao Mountain, Qujing district, Yunnan Province, People's Republic of China, approx. lat. 25° 50′ N, long. 103° 7′ E, Miaokao Formation, Ludlow to Přídolí Series, Upper Silurian.

Derivation of name: Latin *non* and *aculeatus*, prickly; because of the relatively smooth valve surface.

Figured specimens: Nanjing Institute of Geology and Palaeontology, People's Republic of China, nos. **NIGPAS 115620** (holotype, ♀ car.: Pl. **18**, 78, figs. 1, 3), **NIGPAS 115621** (♂ car.: Pl. **18**, 78, fig. 5; Pl. **18**, 80, fig. 4), **NIGPAS 115622** (♀ car.: Pl. **18**, 78, fig. 2; Pl. **18**, 80, fig. 3), **NIGPAS 115623** (tecnomorphic car.: Pl. **18**, 80, figs. 1, 2), **NIGPAS 115624** (♀ car.: Pl. **18**, 78, fig. 4) and **NIGPAS 115625** (♀ car.: Pl. **18**, 80, figs. 5–7). All from sample YQM-33 of the type locality.

Diagnosis: The crumina is ellipsoid-like, not reaching the anterior end of the valve. On the syllobium and sometimes also very weakly developed on the anterior lobe a faint, curved cuspidal ridge is discernible.

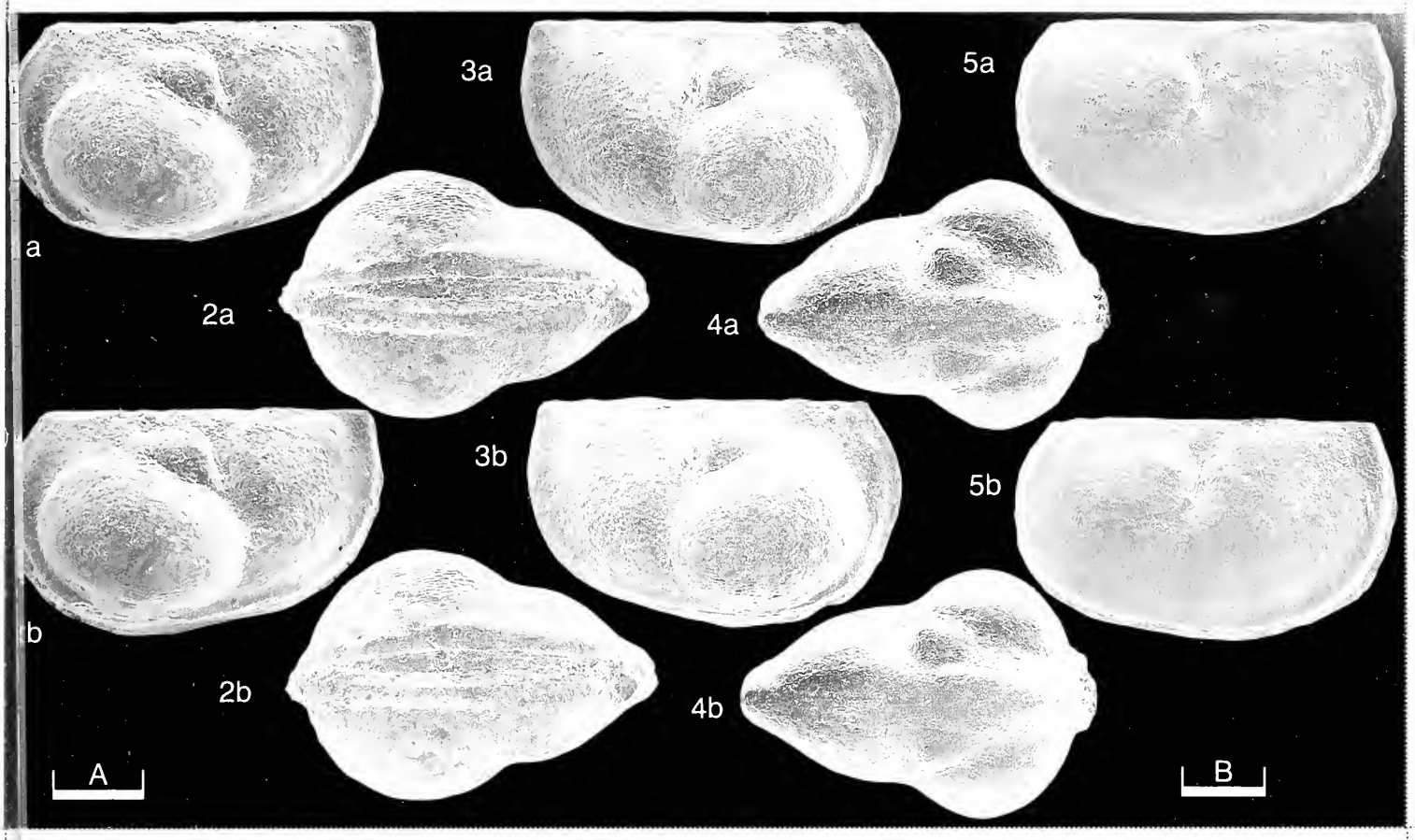
Remarks: In tecnomorphs the preadductorial node in front of a sometimes pit-like adductorial sulcus is mostly completely fused with the very weakly developed anterior lobe. The valve surface is generally smooth; however, in some individuals a very sparse reticulation/reticulostriation or punctation can be traced, especially on the crumina. The velar edge is gently curved along the base of the crumina and is nearly parallel to the marginal structure.

Distribution: Known only from the type area. Kuanti and Miaokao formations, Ludlow to Přídolí Series, Upper Silurian.

Explanation of Plate 18, 80

Figs. 1, 2, tecnomorphic car. (**NIGPAS 115623**, 740 μm long): fig. 1, RV, ext. lat.; fig. 2, ext. vent. Fig. 3, ♀ car., detail of ventral side (**NIGPAS 115622**). Fig. 4, ♂ car., RV, ext. lat. (**NIGPAS 115621**). Figs. 5–7, ♀ car. (**NIGPAS 115625**, 880 μm long): fig. 5, RV, detail of adductorial sulcus; fig. 6, RV, ext. lat.; fig. 7, RV, detail of crumina.

Scale A (150 μm; ×75), figs. 1, 2; scale B (50 μm; ×240), figs. 3, 5, 7; scale C (200 μm; ×60), figs. 4, 6.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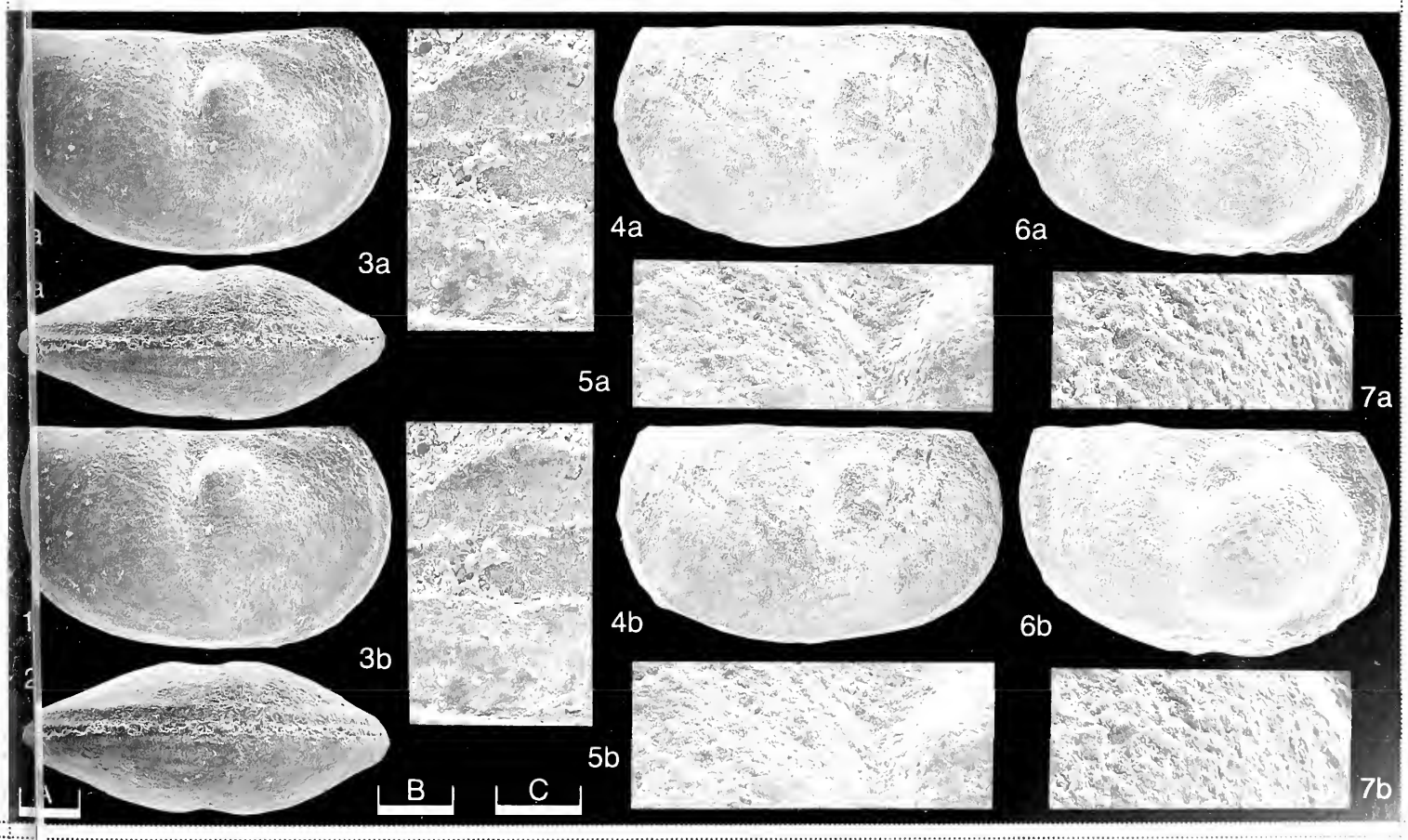
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595.337.21 (113.331) (420 : 162.003.52): 55.351 + 552.54

ON *DALEIELLA CORBULOIDES* (JONES & HOLL)

by Robert F. Lundin & Lee E. Petersen
(Arizona State University, Tempe & Anardarko Petroleum Corporation, Houston, U.S.A.)

Genus DALEIELLA Bouček, 1937
Type-species (by original designation): *Cythere corbuloides* Jones & Holl, 1869

Diagnosis: Large, strongly inequivalved Pachydomellidae(?) with a perimarginal carina on the posteroventral, extending to the ventral surface and even to the anteroventral surface in some species, part of the admarginal surface of one or both valves. Overreach of the right by the left valve strong around entire periphery of the right valve, but especially strong dorsally and posteroventrally. Hinge parallel to longitudinal axis of valve. Shell wall without tubules or pore canals. Carapace width greater than height. Dimorphic(?) by posteriorward displacement of maximum width in heteromorph (presumed female).

Remarks: This genus is similar in general appearance to pachydomellids but the combination of characters including the perimarginal carinae, strong overreach, great carapace width, orientation of the hinge and absence of tubules and pore canals distinguish it from the most similar genera *Microcheilinella* Geis, 1933, *Tubulibairdia* Swartz, 1936 and *Newsomites* Morris & Hill, 1952.

The genus is represented by the type-species, *D. corbuloides* (Jones & Holl, 1869), from the Silurian of Great Britain and Podolia and the following species from the Silurian of Podolia and/or the East Baltic area: *D. acutifinis* Neckaja, 1960, *D. acutifiniformis* = *M. acutifiniformis* Abushik, 1979, and *D. ianica* Neckaja, 1960. The existence of the diagnostic generic characters in *D. triangularis* Bouček, 1937 have not been verified and *D. americana* Morris & Hill, 1952 is most probably a *Krausella* Ulrich, 1894. *D.? canadensis* Copeland, 1962, *D. caleyi* Copeland, 1973 and *D. deubeli* Zagora, 1967 have little in common with the type-species and certainly do not belong to *Daleiella*.

The placement of *Daleiella* and other similar genera without tubules in the Pachydomellidae Berdan & Sohn, 1961 is open to question and would necessitate redefinition of that family. Discussion of suprageneric systematics of this large group of superficially similar genera is beyond the scope of this paper. It is clear, however, that if the presence of tubules is considered to be of less than familial significance, *Daleiella* can be placed with *Tubulibairdia*, *Microcheilinella*, *Newsomites* and others in one family of the Bairdiacea.

Explanation of Plate 18, 82

Figs. 1–3, car. (**ASU X-128**, 959 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. post.; fig. 3, ext. dors. Fig. 4, car., ext. lt. lat. (**ASU X-129**, 1071 μm long).

Scale A (200 μm; ×53), figs. 1–3; scale B (200 μm; ×48), fig. 4.

Daleiella corbuloides (Jones & Holl, 1869)

1869 *Cythere corbuloides* sp. nov. T.R. Jones & H.B. Holl, *Ann. Mag. nat. Hist.*, (4), **3**, 211, pl. 15, figs. 4, 5.
1887 *Xestoleberis corbuloides* (Jones & Holl); T.R. Jones, *Ann. Mag. nat. Hist.*, (5), **19**, 410.
1892 *Xestoleberis corbuloides* (Jones & Holl); J. Smith, *Trans. nat. Hist. Soc. Glasg.*, **3**, 158.
1934 *Microcheilinella corbuloides* (Jones & Holl); R. S. Bassler & B. Kellett, *Spec. Pap. geol. Soc. Am.*, **1**, 412.
1937 *Daleiella corbuloides* (Jones & Holl); B. Bouček, *Mém. Soc. r. Sci. Bohême*, **1936**(2), 7.
1952 *Daleiella corbuloides* (Jones & Holl); R. W. Morris & B. W. Hill, *Bull. Am. Paleont.*, **34**, 13.
1960 *Tubulibairdia? corbuloides* (Jones & Holl); I.G. Sohn, *Prof. Pap. U.S. geol. Surv.*, **330-A**, 75.
1961 *Daleiella corbuloides* (Jones & Holl); R.H. Shaver, *Treatise on Invertebrate Paleontology*, Q, 385, fig. 310A, 5.
1979 *Microcheilinella mukschensis* sp. nov. A.F. Abushik, *Ezheg. vses paleont. Obshch.*, **22**, 51, pl. 3, figs. 1, 2.
1991 *Daliella* [*sic*] *corbuloides* (Jones & Holl); R.F. Lundin, L.E. Petersen & D.J. Siveter, *J. Micropalaeont.*, 9 (2 for 1990), 179, pl. 1, figs. 5, 6.

Lectotype: Designated herein. British Museum (Nat. Hist.) no. **I 2058**; adult carapace. Jones & Holl 1869, pl. 15, figs. 4a–e.

Type locality: "Croft's Quarry," 0.5 km W of Malvern, Hereford & Worcester, England; approximately Nat. Grid Ref. SO 757 464, lat. 52° 08′ N, long. 2° 18′ W. Much Wenlock Limestone Formation, Wenlock Series, Silurian.

Figured specimens: Department of Geology, Arizona State University (**ASU**), nos **X-128** (Pl. **18**, 82, figs. 1–3), **X-129** (car.: Pl. **18**, 82, fig. 4), **X-195** (car.: Pl. **18**, 84, fig. 6), **X-196** (car.: Pl. **18**, 84, fig. 5). British Museum (Nat. Hist.), no. **I 2058** (lectotype, car.: Pl. **18**, 84, figs. 1–4).

The lectotype and **ASU X-195** are topotypes. **ASU X-128** and **X-129** are from Harley Hill (A458) road cutting, 1.2 km NW of Much Wenlock, Shopshire, England (Nat. Grid Ref. SJ 6103 0036) and **ASU X-196** is from an exposure along path just above old railway track, S side of River Severn and about 400 m W of Browers Brook, Benthall Edge, Shropshire (Nat. Grid Ref. SJ 6635 0355); all three from Farley Member, Coalbrookdale Formation, Wenlock Series.

Diagnosis: *Daleiella* with a short perimarginal carina on the posteroventral admarginal surface of both valves and on the anteroventral admarginal surface of the right valve. Surface smooth.

Remarks: Possible dimorphism in this species is suggested by differences in the position of greatest width (compare Pl. **18**, 84, figs. 5, 6). Data are not available at this time to demonstrate if this difference is due to normal variation or dimorphism because large single-sample populations have not been found.

Comparison of Abushik's (1979) figures and specimens she has supplied, with the British materials described here indicate that *D. corbuloides* is conspecific with *Microcheilinella mukschensis* Abushik, 1979. This extends the known geographic distribution of *D. corbuloides*, which heretofore was known only from the Welsh Borderland and English West Midlands (Lundin *et al.* 1991).

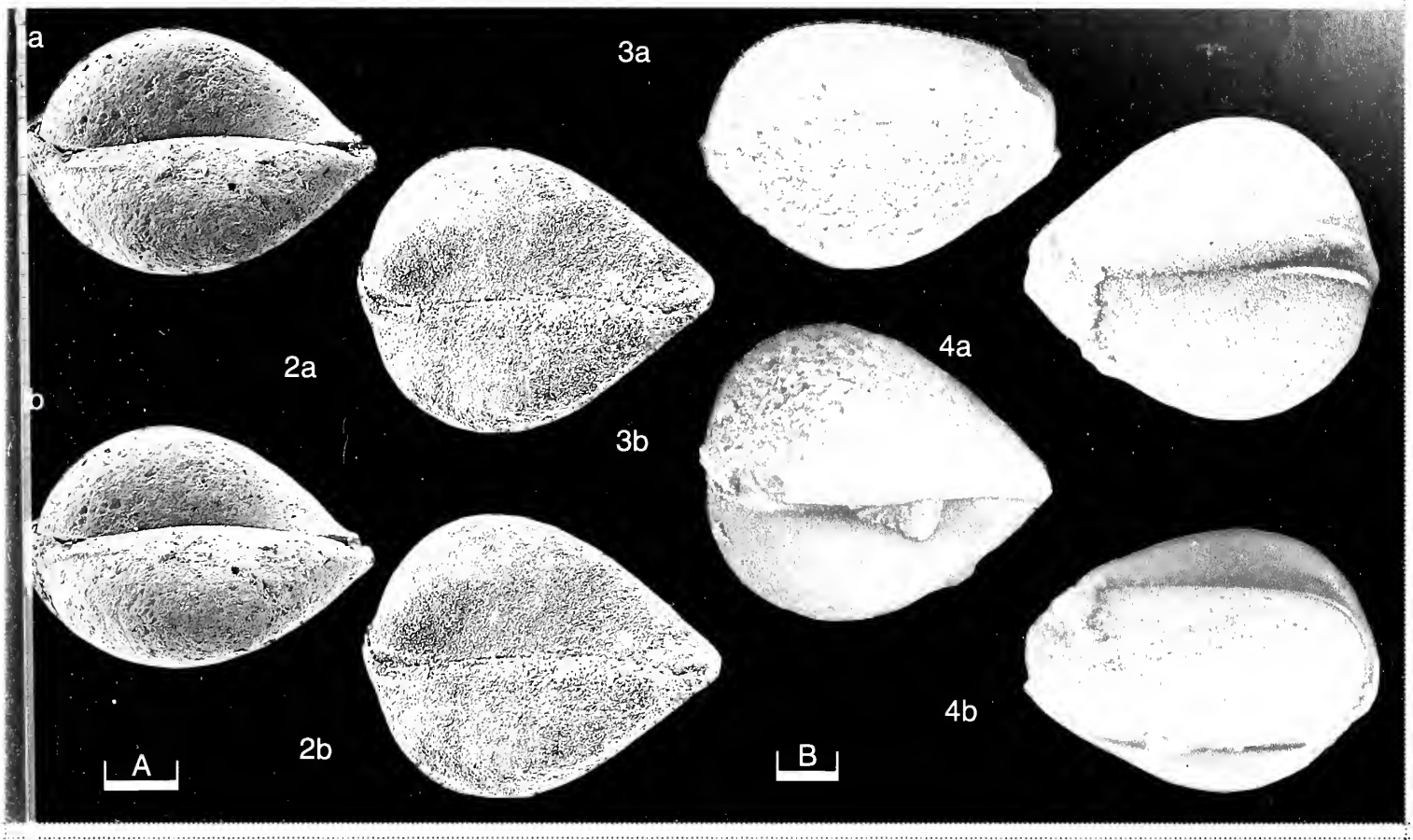
Distribution: Known from many samples of Late Wenlock, Homerian, age and from one sample (locality no. 59 of Lundin *et al.* 1991) of Ludlow, early Gorstian, age in the Welsh Borderland and English West Midlands, and from Late Wenlock stata of Podolia.

Acknowledgements: We gratefully acknowledge the support of NATO, the National Science Foundation (Grant No. EAR-8200816) and the College of Liberal Arts and Sciences, Arizona State University.

Explanation of Plate 18, 84

Figs. 1–4, car. (lectotype, **BMNH I 2058**, 1050 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. vent.; fig. 3, ext. dors.; fig. 4, ext. lt. lat. Fig. 5, car., ext. vent. (**ASU X-196**, 1053 μm long). Fig. 6, car., ext. vent. (**ASU X-195**, 1053 μm long).

Scale A (200 μm; ×48), figs. 1–4; scale B (200 μm; ×49), figs. 5, 6.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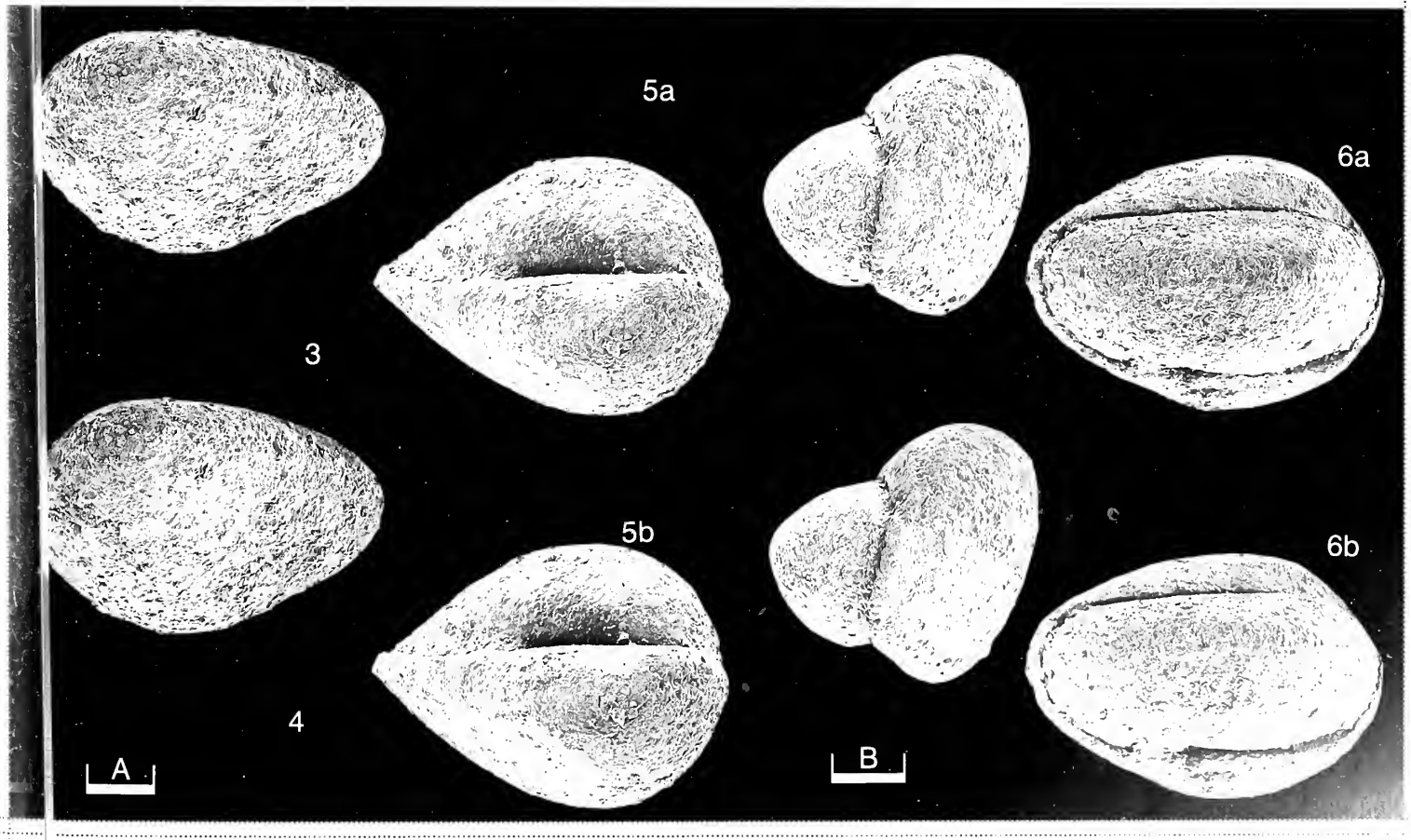
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595.336.14 (113.51) (430 : 161.011.50): 551.351 + 552.54

ON *VILLOZONA VILLOSA* (GRÜNDEL)

by Gerhard Becker & Dieter Weyer
(University of Frankfurt-am-Main & Kulturhistorisches Museum, Magdeburg, Germany)

Genus *VILLOZONA* Gründel, 1965

Type-species (by original designation): *Amphissites (Ectodemites) villosus* Gründel, 1961

Diagnosis: Non-lobate kirkbyid genus with (principally) evenly convex lateral surface. Inner carina can be present or absent; incomplete, weak dorsal ridge may be developed, but no distinct dorsum present. Carapace surface smooth or finely reticulate to irregularly striate. Adductorial pit defined or lacking.

Distribution: Europe, Asia, N Africa; Lower Devonian–Lower Carboniferous.

Villozona villosa (Gründel, 1961)

1961 *Amphissites (Ectodemites) villosus* sp. nov. J. Gründel, *Freiberger-ForschHft.*, **C111**, 87, 88, pl. 2, figs. 3–6.
1965 *Villozona villosa* (Gründel); J. Gründel, *Freiberger-ForschHft.*, **C182**, 60.
1987 *Villozona villosa* (Gründel); G. Becker, *Palaeontographica*, **A200**, 60 (q.v. for full synonymy).

Holotype: Geological Institute, "Bergakademie Freiberg, Sachsen", Germany, no. **21/21**; an adult, silicified left valve.

Type locality: Quarry "Pfaffenberg NE", near Obernitz village, 3 km SSE Saalfeld, E Thüringisches Schiefergebirge, Germany; lat. 50° 38′ N, long. 11° 24′ W. Nodule bearing cephalopod limestones; *Gattendorfia* stage, Lower Carboniferous. Pelagic facies, ostracod fauna of Thuringian ecotype.

Explanation of Plate 18, 86

Figs. 1, 2, adult LV (topotype, **SMF Xe 15144**, 1500 μm long): fig. 1, ext. lat.; fig. 2, detail of ext. lat. surface. Fig. 3, adult LV, dors. obl. (**SMF Xe 15145**, 1380 μm long). Fig. 4, juv. LV, ext. lat. (topotype, **SMF Xe 15146**, 1150 μm long).
Scale A (300 μm; ×50), figs. 1, 3, 4; scale B (100 μm; ×87), fig. 2.

Figured specimens: Forschungs-Institut Senckenberg, Frankfurt am Main (SMF), Federal Republic of Germany, nos. **SMF Xe 15144** (adult LV: Pl. **18**, 86, figs. 1, 2), **SMF Xe 15145** (adult LV: Pl. **18**, 86, fig. 3; Pl. **18**, 88, fig. 6), **SMF Xe 15146** (juv. LV: Pl. **18**, 86, fig. 4), **SMF Xe 15147** (juv. car.; Pl. **18**, 88, fig. 1), **SMF Xe 15148** (juv. RV: Pl. **18**, 88, fig. 2), **SMF Xe 15149** (juv. LV: Pl. **18**, 88, fig. 3), **SMF Xe 15150** (adult LV: Pl. **18**, 88, fig. 4), **SMF Xe 15151** (juv. car.: Pl. **18**, 88, fig. 5).

All except one of the figured specimens are topotype material; specimen **SMF Xe 15145** is from Quarry "Pfaffenberg SE", *Gattendorfia* stage, Lower Carboniferous.

Diagnosis: *Villozona* species with narrow to wide inner carina. Adductor spot obscure.

Remarks: Two subspecies are distinguished by means of the inner carina. The typical *V. villosa villosa* (Gründel, 1961), is characterized by a very wide inner carina and an ornamented carapace surface; it occurs in the early Lower Carboniferous. All of the figured specimens belong to this subspecies. *Villozona villosa praecursor* Bartzsch & Weyer, 1980, (*Abh. Ber. Naturk. Vorgesch.*, **12**(2), 43, figs. 5.1–5), which is abundant in the upper Famennian (do V–VI; Upper Devonian) of Europe and N Africa, has a narrow inner carina and a smooth carapace surface.

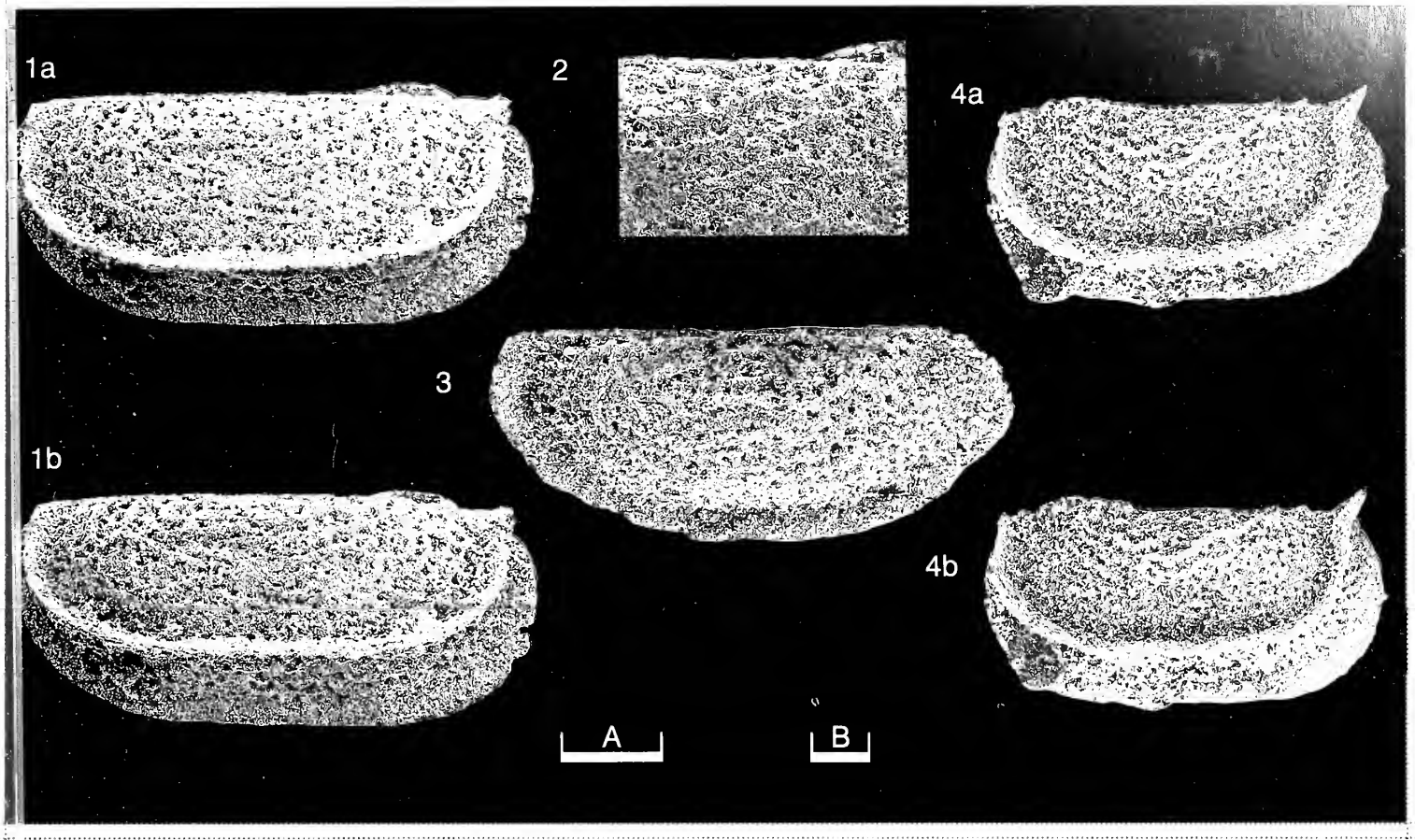
The late Palaeozoic to early Triassic *Carinaknightina* Sohn, 1970 shows a distinct dorsal carina. Devonian and Carboniferous "*Kummerowia*" species (*in litt.*) belong to the "*Villozona* line" (Weyer, D. & Becker, G., *Senckenberg leth.*, **71**, 221, 1991).

V. villosa (sensu lato) is considered to have been a nectobenthic species. The dorsoterminal spines (of juveniles) are thought to be biotope indicative features characteristic of low-energy palaeoenvironments.

Distribution: *V. v. villosa* occurs in Central Europe; *Gattendorfia* stage, Lower Carboniferous.

Explanation of Plate 18, 88

Fig. 1, juv. car., dors. (topotype, **SMF Xe 15147**, 1120 μm long). Fig. 2, juv. RV, vent. (topotype, **SMF Xe 15148**, 1150 μm long). Fig. 3, juv. LV, int. lat. (topotype, **SMF Xe 15149**, 1150 μm long). Fig. 4, adult LV, post. (topotype, **SMF Xe 15150**, 1450 μm long). Fig. 5, juv. car., vent. (topotype, **SMF Xe 15151**, 1270 μm long). Fig. 6, adult LV, vent. (**SMF Xe 15145**, 1380 μm long).
Scale (300 μm; ×50), figs. 1–6.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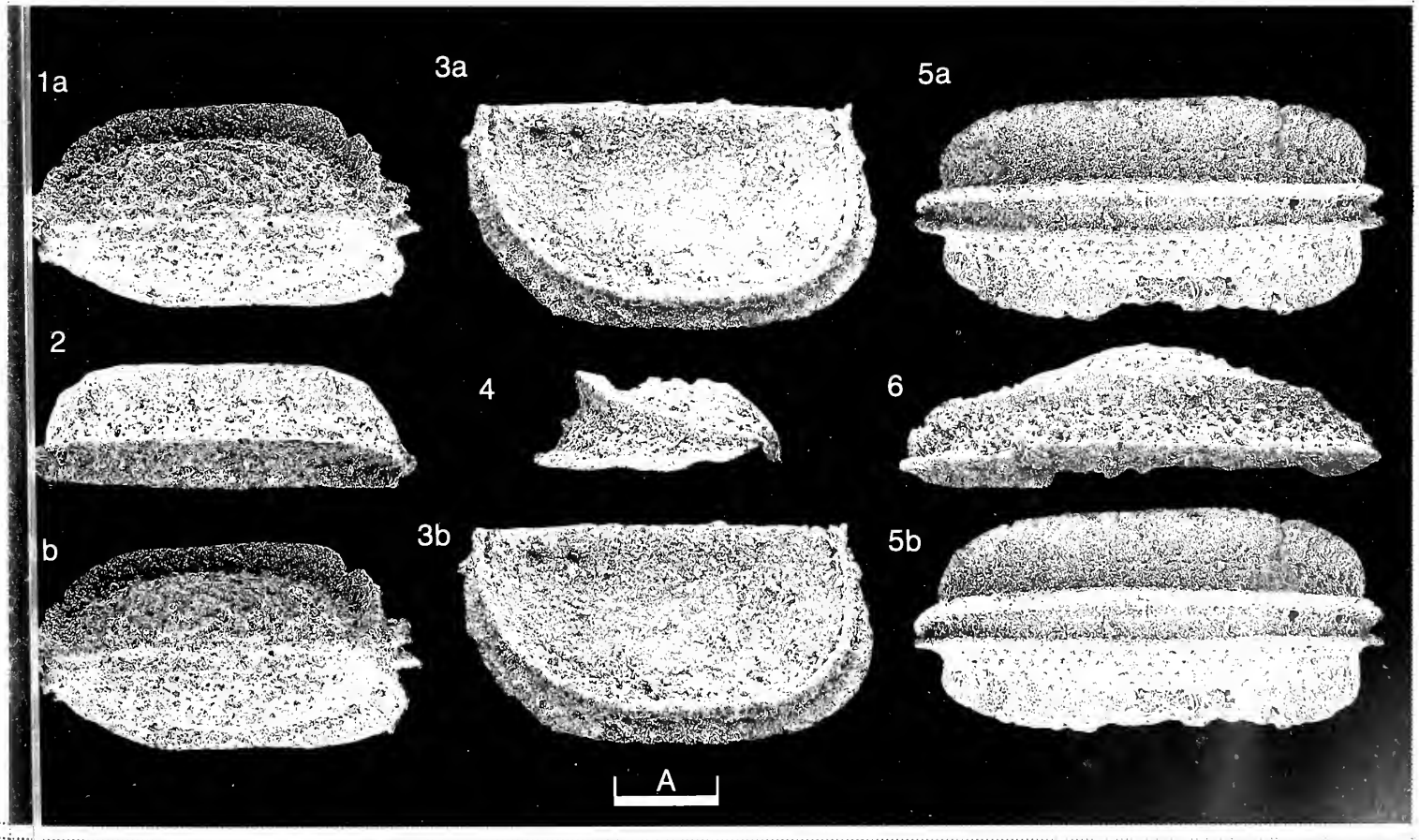
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595.336.11 (113.42) (766 : 162.097.34): 551.351 + 552.54

ON *HUNTONELLA BRANSONI* LUNDIN

by David J. Siveter & Robert F. Lundin
(University of Leicester, England & Arizona State University, Tempe, U.S.A.)

Genus *HUNTONELLA* Lundin, 1968
Type-species (by original designation): *Huntonella bransoni* Lundin, 1968

Diagnosis: Tuberculate Amphitoxotidinae in which both the velar edge and the torus cross the crumina without any deflection or interruption. Velum wide, continues precruminally, is abruptly restricted posteroventrally, has a prominent border crest. Syllobium, preadductorial node and anterior lobe are well differentiated, have lowly elevated connections, lack cusps.

Remarks: An entire and unmodified velar edge across the crumina is also a characteristic of the amphitoxotidines *Dibolbina* Ulrich & Bassler, 1923 (*Md geol. Surv., Silurian volume*), *Berolinella* Martinsson, 1962 (*Bull. geol. Instn Univ. Uppsala*, **41**) and *Tropidotoxotis* Siveter, 1980 (*Palaeontogr. Soc. [Monogr.]*, **133**, (No. 556), for 1979). *Huntonella* differs from *Dibolbina* in having no basal crest, crista or entire velum; from *Berolinella* (see Hansch, W. & Siveter, D.J., *Stereo-Atlas Ostracod Shells*, **16**, 106–111, 1989) in lacking a basal crest and in having a border crest; from *Tropidotoxotis* in having a torus and a border crest; and from all three genera in details of lobal morphology and ornament. Furthermore, the cruminal part of the velar edge in *Huntonella* is particularly wide in lateral view.

Explanation of Plate 18, 90

Figs. 1–3, ♀ LV (**OU 5923**, 1575 μm long): fig. 1, ext. lat.; fig. 2, ant.; fig. 3, vent. Figs. 4–6, tecnomorphic RV (**OU 5922c**, 1200 μm long): fig. 4, vent.; fig. 5, ant.; fig. 6, ext. lat.
Scale A (300 μm; ×30), figs. 1–3; scale B (300 μm; ×40), figs. 4–6.

Distribution: Henryhouse Formation, Oklahoma (Lundin, *Bull. Okla geol. Surv.*, **108**, 1965; 1968 *op. cit.*); Ludlow/Přídolí series, Silurian. Haragan Formation, Oklahoma (Lundin 1968) and Rockhouse and Birdsong formations, western Tennessee (Lundin & Petersen 1974; Petersen & Lundin, *Okla geol. Surv.*, *in press*); Gedinnian, Devonian.

Huntonella bransoni Lundin, 1968

1968 *Huntonella bransoni* n. sp. R.F. Lundin, *Bull. Okla. geol. Surv.*, **116**, 22, pl. 1, figs. 1a–k.
1974 *Huntonella bransoni* Lundin; R.F. Lundin & L.E. Petersen, *J. Paleont.*, **48**, 242, pl. 1, figs. 11–13.

Holotype: Oklahoma University, Norman, no. **OU 5921**; female right valve.

Type locality: Near old Hunton townsite, Coal County, Oklahoma; approx. lat. 34° 30′ N, long. 96° 30′ W; 166 feet above base of Haragan Formation, Devonian.

Figured specimens: Oklahoma University, nos. **OU 5921** (holotype, ♀ RV: Pl. **18**, 92, figs. 1–3), **OU 5922b** (tecnomorphic RV: Pl. **18**, 92, figs. 4, 5), **OU 5922c** (tecnomorphic RV: Pl. **18**, 90, figs. 4–6), **OU 5923** (♀ LV: Pl. **18**, 90, figs. 1–3). All from between 155 and 212 feet above base of the Haragan Formation at the type section, Oklahoma.

Diagnosis: *Huntonella* species with an abruptly restricted velum posteroventrally.

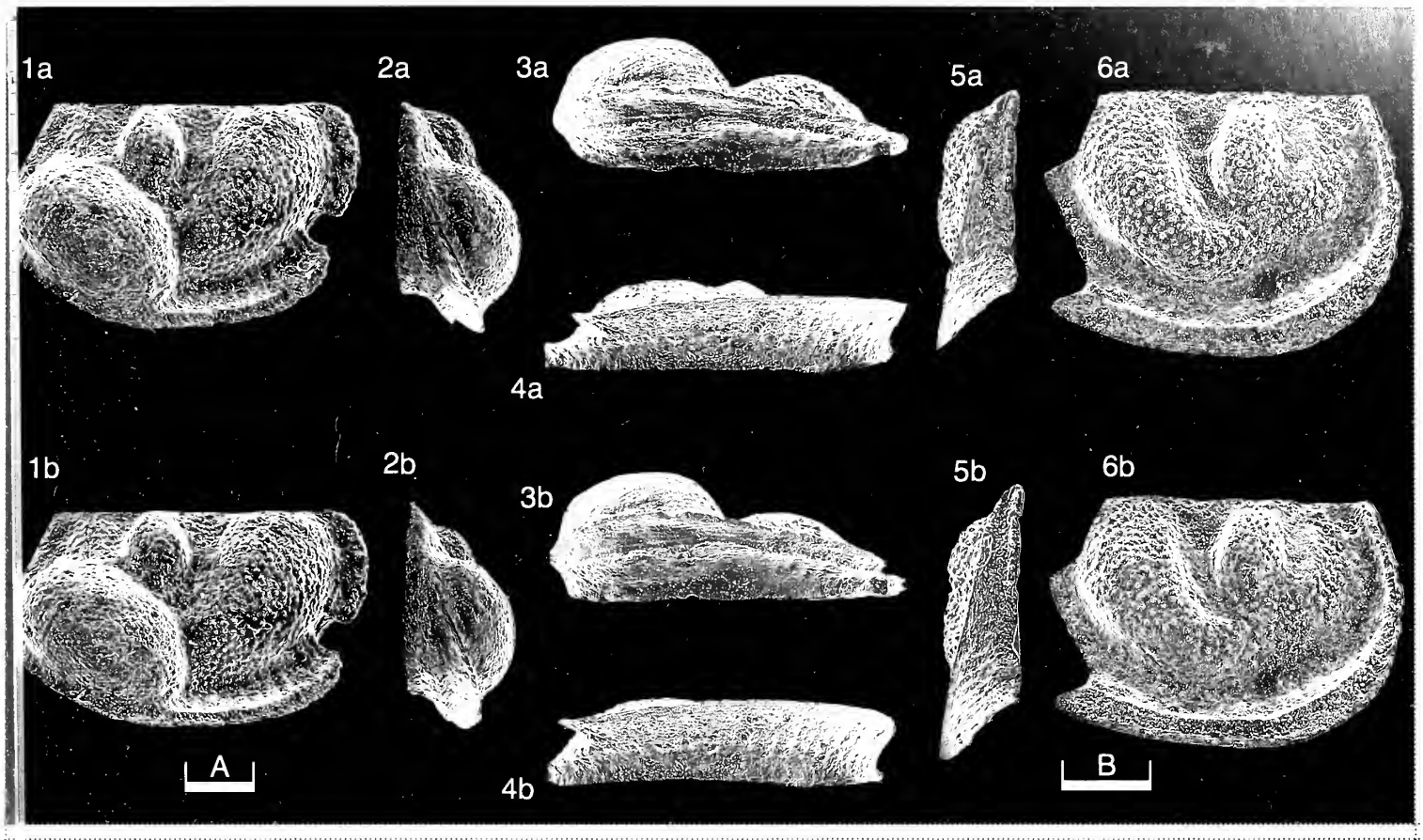
Remarks: *H. bransoni* differs from *Huntonella fittsi* (Roth, 1929), from the Henryhouse Formation of Oklahoma, in details of velar and lobal morphology.

Distribution: Haragan Formation, Oklahoma (Lundin 1968) and Rockhouse and Birdsong formations, western Tennessee (Lundin & Petersen 1974; Petersen & Lundin *in press*); Gedinnian, Devonian.

Acknowledgement: The authors wish to thank NATO for its support for their collaborative research programme.

Explanation of Plate 18, 92

Figs. 1–3, ♀ RV (holotype, **OU 5921**, 1500 μm long): fig. 1, ant.; fig. 2, ext. lat.; fig. 3, ornament on crumina. Figs. 4, 5, tecnomorphic RV (**OU 5922b**, 975 μm): fig. 4, ant.; fig. 5, ext. lat.
Scale A (300 μm; ×35), figs. 1, 2; scale B (50 μm; ×160), fig. 3; scale C (300 μm; ×50), figs. 4, 5.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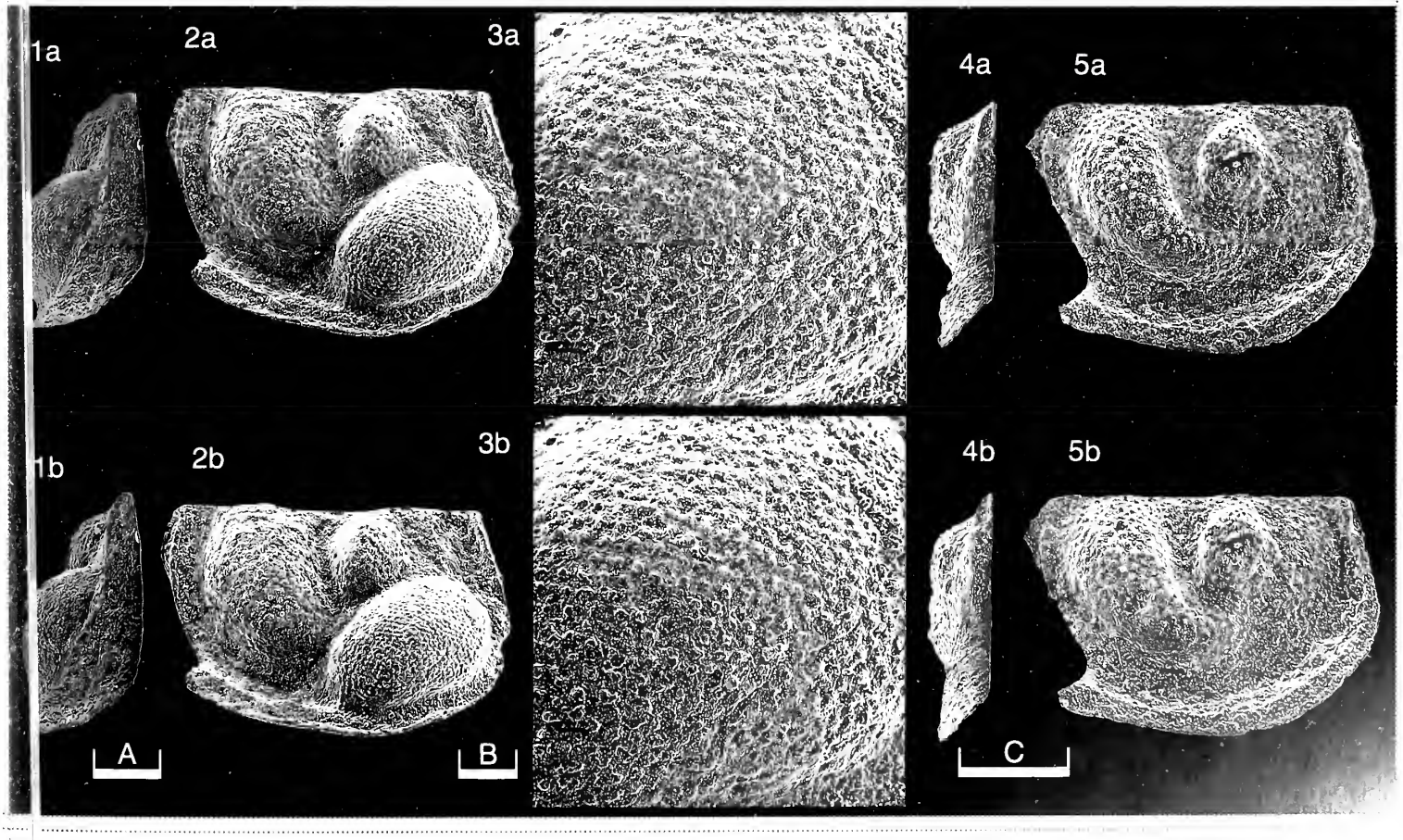
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Stereo-Atlas of Ostracod Shells 18 (23) 93–96 (**1991**)
595.337.14 (119.9) (510 : 161.119.34): 551.351

ON *PARACATHAYCYTHERE COSTAERETICULATA* WHATLEY & ZHAO gen. et sp. nov.

by Robin C. Whatley & Zhao Quanhong
(University College of Wales, Aberystwyth, UK & Tongji University, Shanghai, China)

Genus *PARACATHAYCYTHERE* gen. nov.
Type species: *Paracathaycythere costaereticulata* sp. nov.

Derivation of name: Gr. *παρα* = near + *Cathaycythere*.

Diagnosis: Medium-sized; thin-shelled, elongate and subrectangular in lateral view, greatest height at blunt anterior cardinal angle and greatest length subventrally; dorsal margin straight, slightly oblique; ventral margin with slight oral concavity; anterior margin broadly rounded; posterior margin with truncated posterodorsal slope and narrowly rounded posteroventral slope; posterior cardinal angle distinct. LV slightly overlaps RV at anterior cardinal angle and along posterdorsal slope of posterior margin. Surface reticulate and costate or tuberculate/papillate with costae, always with prominent rib extending from the ocular region diagonally towards the anteroventral margin. Sub-central tubercle and its surrounding sulcus feebly developed, best seen interiorly; anterior margin finely or moderately denticulate; coarser denticules line the posteroventral margin; mid-posterior margin with distinct flange. Eye tubercle weakly present or indistinct. Sexual dimorphism distinct, male more slender than female. Hinge weak, modified amphidont. In RV the terminal short elements are slightly denticulate teeth, the anteromedian locule is shallow while the posteromedian groove is locellate and open antero-ventrally; in LV each terminal socket has a rounded anti-slip toothlet ventrally, the club-like anteromedian element is slightly crenulate with a cusp at its anteriormost end. Inner lamella wide and avestibulate; radial pore canals long, fine, simple and few; selvage peripheral except at posterior margin where it is directed inwards away from the outer margin. Adductor scars small, in a vertical row of 4 closely-packed scars; frontal scar single, heart-shaped.

Explanation of Plate 18, 94

Fig. 1, ♀ car., ext. lat. (paratype, **OS 13743**, 554 μm long); Fig. 2, ♂ RV, ext. lat. (paratype, **OS 13744**, 585 μm long); Fig. 3, ♂ car., ext. lat. (paratype, **OS 13745**, 585 μm long).
Scale A (200 μm; ×98); figs. 1–3.

Remarks: *Paracathaycythere* is somewhat similar to *Cathaycythere* Whatley & Zhao, 1987, *Neosinocythere* Huang, 1985, *Sinocythere* Hou, 1982, and *Spinileberis* Hanai, 1961 in many features of carapace morphology. All share the widely flared anterior margin, the very wide avestibulate anterior inner lamella and the small ventral tooth situated within the posterior terminal socket of the LV hinge. *Paracathaycythere* is thinner-shelled than the other genera and also has a much less strongly developed amphidont hinge. The genus is probably related to *Hemikrithe* Van den Bold, 1950 which has a similar shape but lacks the same details of hingement. The ventral tooth in the terminal hinge element of the LV is very similar to the "auriline" tooth of *Aurila* Pokorný, 1955 and its allies within the Hemicytheridae. That this is an entirely coincidental resemblance is evidenced by other carapace characters, such as the muscle scars which clearly place this genus in the Trachyleberididae although, by virtue of its similarity to *Cathaycythere*, *Sinocythere* and *Spinileberis* it probably belongs to the Sinocytherinae Huang, 1985. *Hemikrithe* may also belong to this subfamily.

Paracathaycythere costaereticulata sp. nov.

Holotype: British Museum (Nat. Hist.), no. **OS 13742**, ♂ car., subsequently split into RV and LV.
[Paratypes, British Museum (Nat. Hist.), nos. **OS 13743–6**].

Type locality: Lianyungang Harbour, Jiangsu Province, on the Yellow Sea cost, approx. lat. 34° 44′ N, long. 119° 23′ E; silty fine sand, intertidal zone, Recent.

Derivation of name: L. *costae* = ribs + *reticulata*, referring to the nature of ribs and reticulae which constitute the ornament of this species.

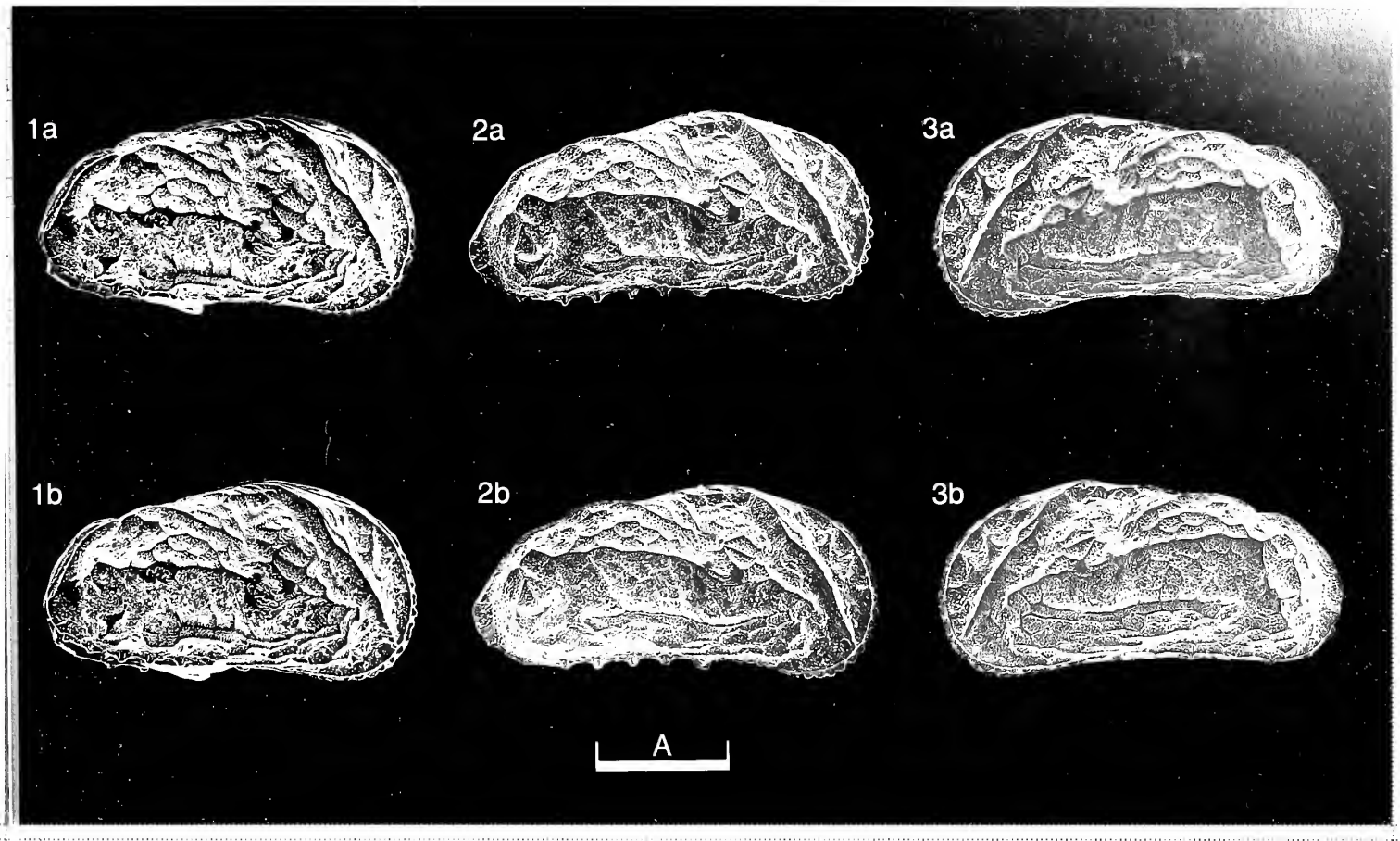
Figured specimens: British Museum (Nat. Hist.) nos. **OS 13743** (paratype, ♀ car.: Pl. **18**, 94, fig. 1), **OS 13744** (paratype, ♂ RV: Pl. **18**, 94, fig. 2), **OS 13745** (paratype, ♂ car.: Pl. **18**, 94, fig. 3), **OS 13746** (paratype, ♂ car.: Pl. **18**, 96, fig. 1), **OS 13742** (holotype, ♂LV: Pl. **18**, 96, fig. 2), **OS 13742** (holotype, ♂ RV: Pl. **18**, 96, fig. 3); all are from the type locality.

Diagnosis: As for genus but with ornament of ribs and reticulae. Apart from the oblique ocular rib characteristic of the genus, a diagonal median rib extends across the carapace from the posterodorsal to anteroventral, being interrupted by the weak subcentral tubercle. A ventrolateral rib extends approximately parallel to the ventral margin to its anterior union with the median rib. A short rib extends towards the median rib from the posterodorsal loop. Intercostal area irregularly reticulate; solae of reticulae finely punctate.

Distribution: Pleistocene to Recent, eastern China. Living specimens are found in the littoral zone along Chinese coasts from approx. lat. 18° to 35°N, in salinity of 32 to 35‰, and on silt to medium sand.

Explanation of Plate 18, 96

Fig. 1, ♂ car. dors. (paratype, **OS 13746**, 585 μm long); Fig. 2, ♂ LV, int. lat. (holotype, **OS 13742**, 615 μm long); Fig. 3, ♂ RV, int. lat. (holotype, **OS 13742**, 615 μm long).
Scale A (200 μm; ×98); figs. 1–3.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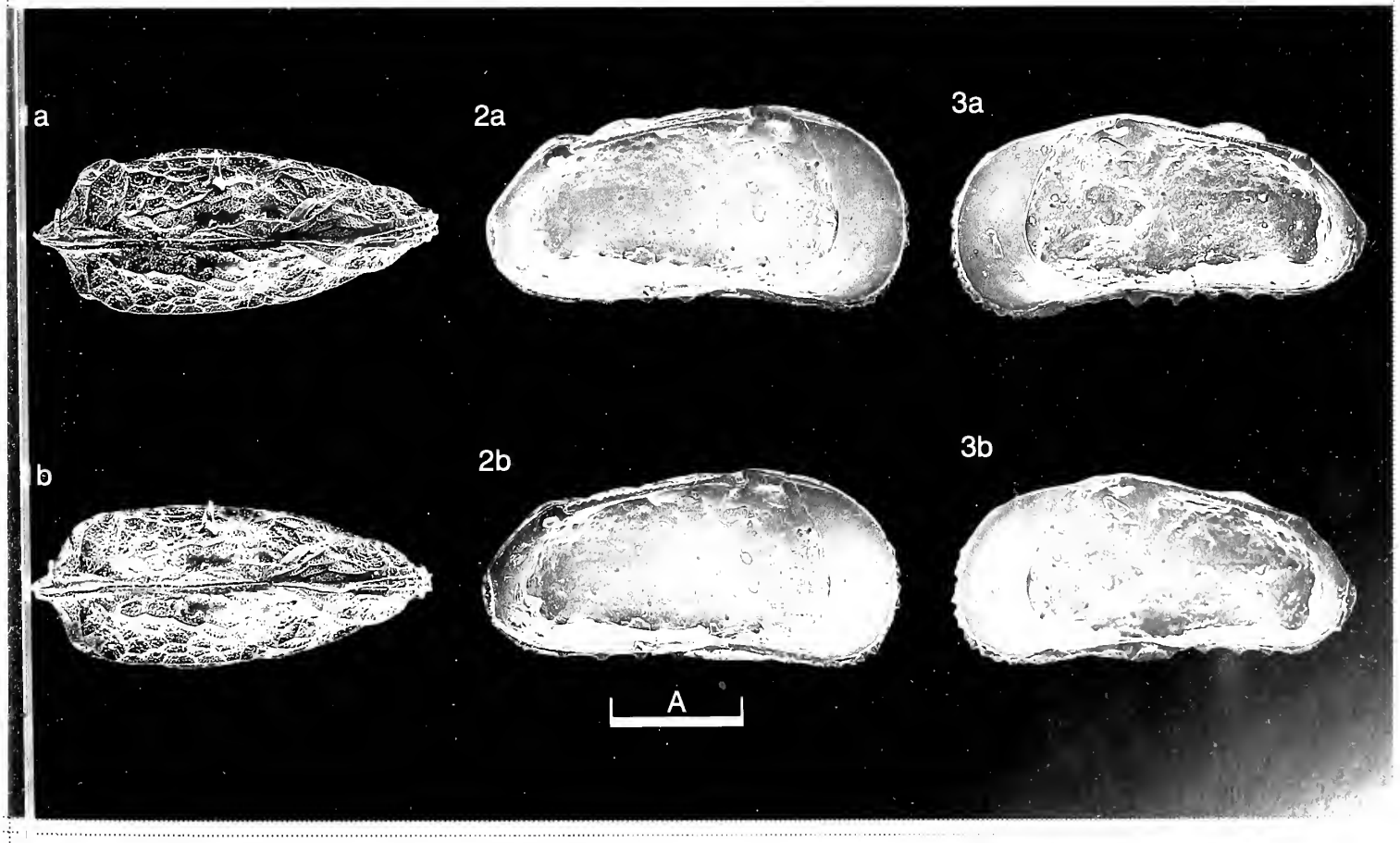
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595.337.14 (119.1) (510 : 161.114.20): 552.51 + 52

ON *PARACATHAYCYTHERE SCABRA* ZHAO & WHATLEY sp. nov.

by Zhao Quanhong & Robin C. Whatley
(Tongji University, Shanghai, China & University College of Wales, Aberystwyth, UK)

Paracathaycythere scabra sp. nov.

Holotype: British Museum (Nat. Hist.) no. **OS 13747**, ♀ right valve.
[Paratypes: British Museum (Nat. Hist.) nos. **OS 13748–51**].

Type locality: Shelf hole ZQ3, lat. 20° 58.05′ N, long. 114° 30.00′ E, water depth 89 m, off Guangdong Province, northern part of the South China Sea; core samples from hole depths of 54.0–54.1, 92.1–92.2 and 96.3–96.9 m, silt and fine sand, mid-Pleistocene.

Derivation of name: L. *scabra* = rough, with reference to the roughly tuberculate surface ornament of this species.

Figured specimens: British Museum (Nat. Hist) no. **OS 13747** (holotype, ♀ RV: Pl. **18**, 98, fig. 1), **OS 13748** (paratype, ♀ LV: Pl. **18**, 98, fig. 2), **OS 13749** (paratype, ♂ LV: Pl. **18**, 98, fig. 3), **OS 13750** (paratype, ♀ LV: Pl. **18**, 100, fig. 1), **OS 13751** (parataype, ♂ RV: Pl. **18**, 100, fig. 2); all are from the type locality.

Explanation of Plate 18, 98

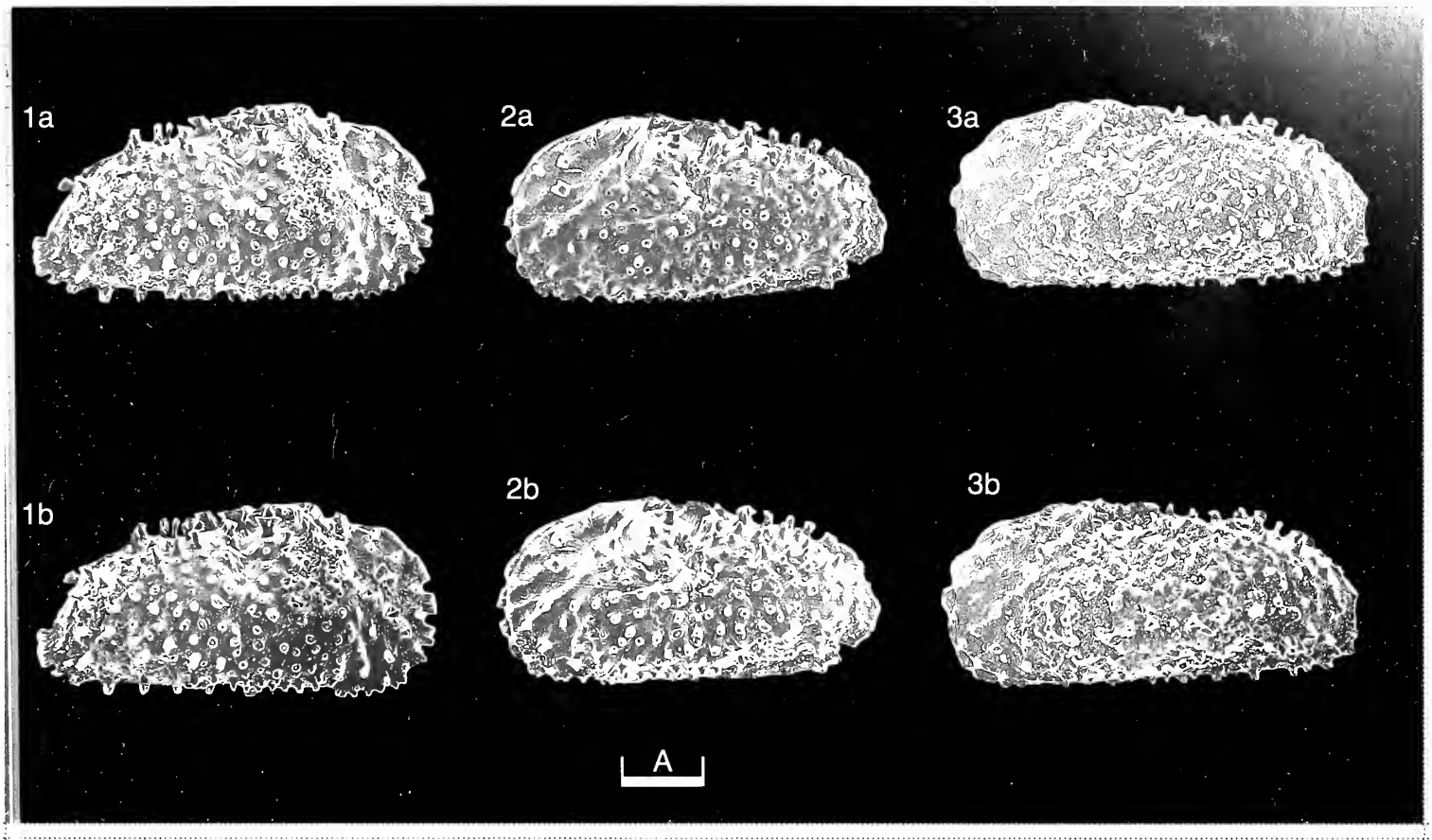
Fig. 1, ♀ RV, ext. lat. (holotype, **OS 13747**, 533 μm long); Fig. 2, ♀ LV, ext. lat. (paratype, **OS 13748**, 514 μm long); Fig. 3, ♂ LV, ext. lat. (paratype, **OS 13749**, 562 μm long).
Scale A (100 μm; ×105), figs. 1–3.

Diagnosis: As for the genus (see R. C. Whatley & Zhao Quanhong, *Stereo-Atlas Ostracod Shells* **18**, 93–96, 1991) but with an ornament of dense, rather irregularly distributed tubercles and papillae. Some of these are conical, others are spatulate and others, particularly dorsally are castellate; most, if not all, are penetrated by a normal pore. A strong diagonal ocular rib is formed in front by aligned tubercles.

Distribution: Only known from the type locality.

Explanation of Plate 18, 100

Fig. 1, ♀ LV, int. lat. (parataype, **OS 13750**, 545 μm long); Fig. 2, ♂ RV, int. lat. (paratype, **OS 13751**, 562 μm long).
Scale A (100 μm; ×173), figs. 1, 2.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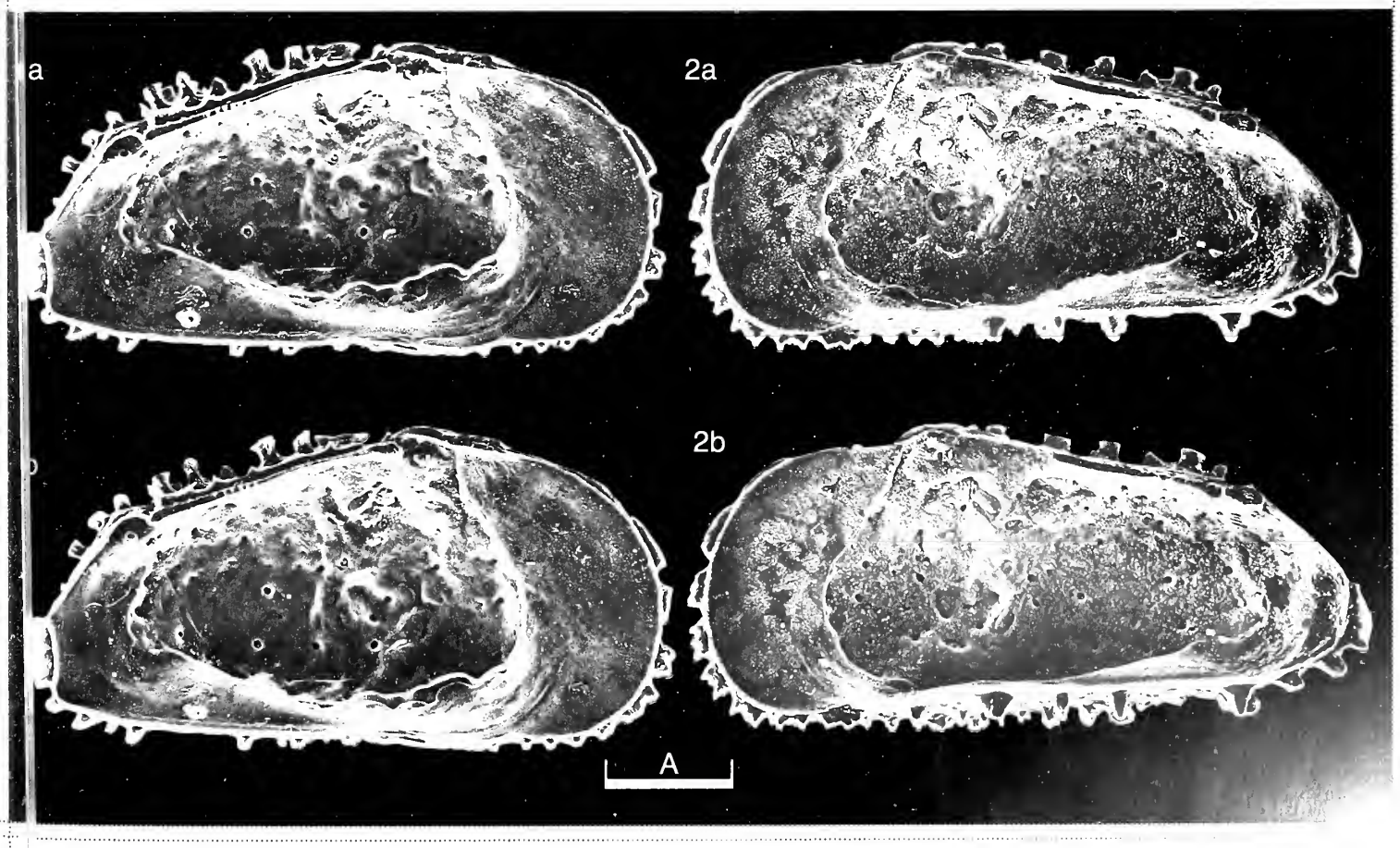
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595.337.14 (119.9 + 119.4) (510 : 161.121.29 + 161.119.33): 551.313.1 + 552.52

ON *COCOONOCYTHERE SINENSIS* ZHAO

by Zhao Quanhong & Robin C. Whatley
(Tongji University, Shanghai, China & University College of Wales, Aberystwyth, UK)

Genus COCOONOCYTHERE Zhao, 1984

Type-species: *Cocoonocythere sinensis* Zhao, 1984

1984 *Cocoonocythere* gen. nov. Zhao Quanhong, *Mar. Geol. & Quatern. Geol.*, **4**, 53.

Diagnosis: Small; ovate in lateral view with greatest height posteromedianly and greatest length at mid-height; dorsal margin slightly arched; ventral margin parallel and gently concave medially; anterior margin broadly rounded; posterior margin bluntly rounded in female and narrowly rounded in male. Carapace inflated, ovate in dorsal view with convex lateral margins, narrowly rounded anterior and bluntly rounded posterior ends. Sexual dimorphism distinct, male slimmer than female. External surface smooth and internal surface finely and densely pitted. Hinge lophodont: terminal teeth in right valve small and simple, long median groove smooth and open ventrally. Inner lamella very narrow, avestibulate; radial pore canals short, straight and simple, moderate in number. Adductor scars large, in a vertical row of 4 with a large V-shaped frontal scar.

Remarks: *Cocoonocythere* is somewhat similar in its small size, hinge and muscle scars, to *Microcythere* G. W. Müller, 1984, but differs in its carapace being rounded anteriorly and posteriorly and in its very narrow inner lamella. Given its large V-shaped frontal scar and narrow inner lamella it is readily distinguished

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Explanation of Plate 18, 102

Fig. 1, ♀ RV, ext. lat. (**OS 13711**, 339 μm long); Fig. 2, ♂ LV, ext. lat. (**OS 13712**, 342 μm long); Fig. 3, ♀ LV, ext. lat. (**OS 13713**, 342 μm long).

Scale A (100 μm; ×180); figs. 1–3.

from other smooth genera common in the coastal zone such as *Cobanocythere* Hartmann, 1959, *Cytherois* G. W. Müller, 1884, *Paracytherois* G. W. Müller, 1894 and *Paracytheroma* Juday, 1907.

Cocoonocythere sinensis Zhao, 1984

1982 Gen. et sp. 2, Hou *et al.*, *in* Hou Youtang *et al.*, *Cretaceous-Quaternary ostracode fauna from Jiangsu*, Geol. Publ. House (Beijing), 245, 246, pl. 88, figs. 21–23.

1984 *Cocoonocythere sinensis* gen. et sp. nov. Zhao Quanhong, *Mar. Geol. & Quatern. Geol.*, **4**(1), 53, text-fig. 4; pl. 2, figs. 15–21.

1985 *Cocoonocythere sinensis* Zhao; Zhao Quanhong, *Acta oceanol. sin.*, **7**(2), 196–199, pl. 1, fig. 15.

1985 *Cocoonocythere sinensis* Zhao; Wang *et al.*, *in* Wang Pinxian *et al.*, *Marine Micropaleontology of China*, China Ocean Press & Springer-Verlag, pl. 30, fig. 12.

Holotype: Department of Marine Geology, Tongji University, Shanghai, China; no. **T6204**, ♀ carapace (not figured herein).

Type locality: Xiangshangang Bay, Xidian, Zhejiang Province, China, approx. lat. 29°22′N, long. 121°27′E; supratidal pool, grey silt, Recent.

Figured specimens: British Museum (Nat. Hist.) nos. **OS 13711** (♀ RV: Pl. **18**, 102, fig. 1), **OS 13712** (♂ LV: Pl. **18**, 102, fig. 2), **OS 13713** (♀ LV: Pl. **18**, 102, fig. 3), **OS 13714** (♀ car.: Pl. **18**, 104, fig. 1), **OS 13715** (♀ LV: Pl. **18**, 104, fig. 2), **OS 13716** (♀ RV: Pl. **18**, 104, fig. 3). No. **OS 13714** is from the type locality and others are from Jianhu County, Jiangsu province, East China, approx. lat. 33°26′E, long. 119°46′N, Holocene, grey mud.

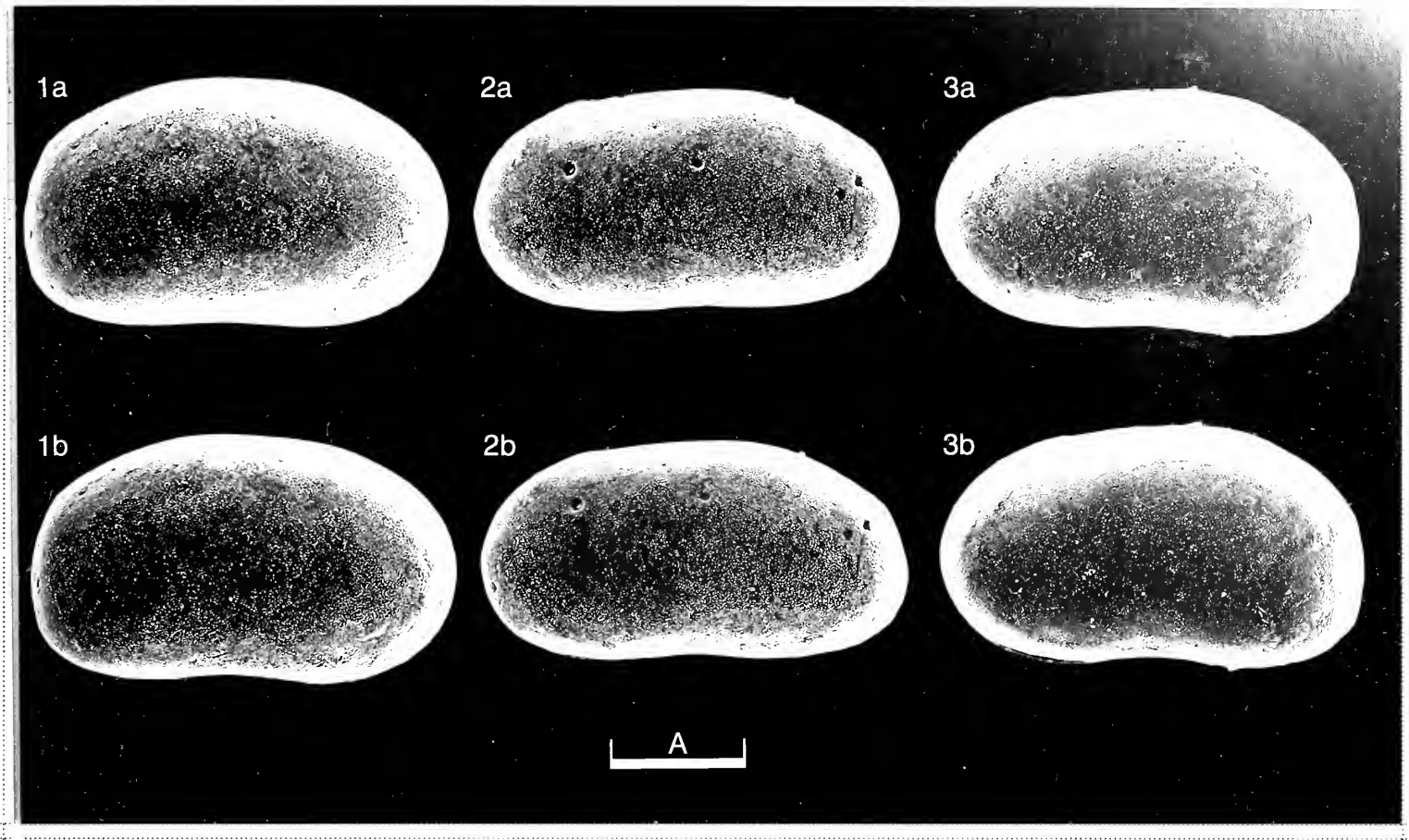
Diagnosis: As for the genus.

Distribution: Pleistocene to Recent, Jiangsu and Zhejiang Provinces, East China. Living specimens are found in bottom samples of mud or silt of supratidal pools, channels, marshes and littoral flats, with water salinity ranging from 5 to 32‰.

Explanation of Plate 18, 104

Fig. 1, ♀ car. ext. dors. (**OS 13714**, 328 μm long); Fig. 2, ♀ LV, int. lat. (**OS 13715**, 339 μm long); Fig. 3, ♀ RV, int. lat. (**OS 13716**, 339 μm long).

Scale A (100 μm; ×180); figs. 1–3.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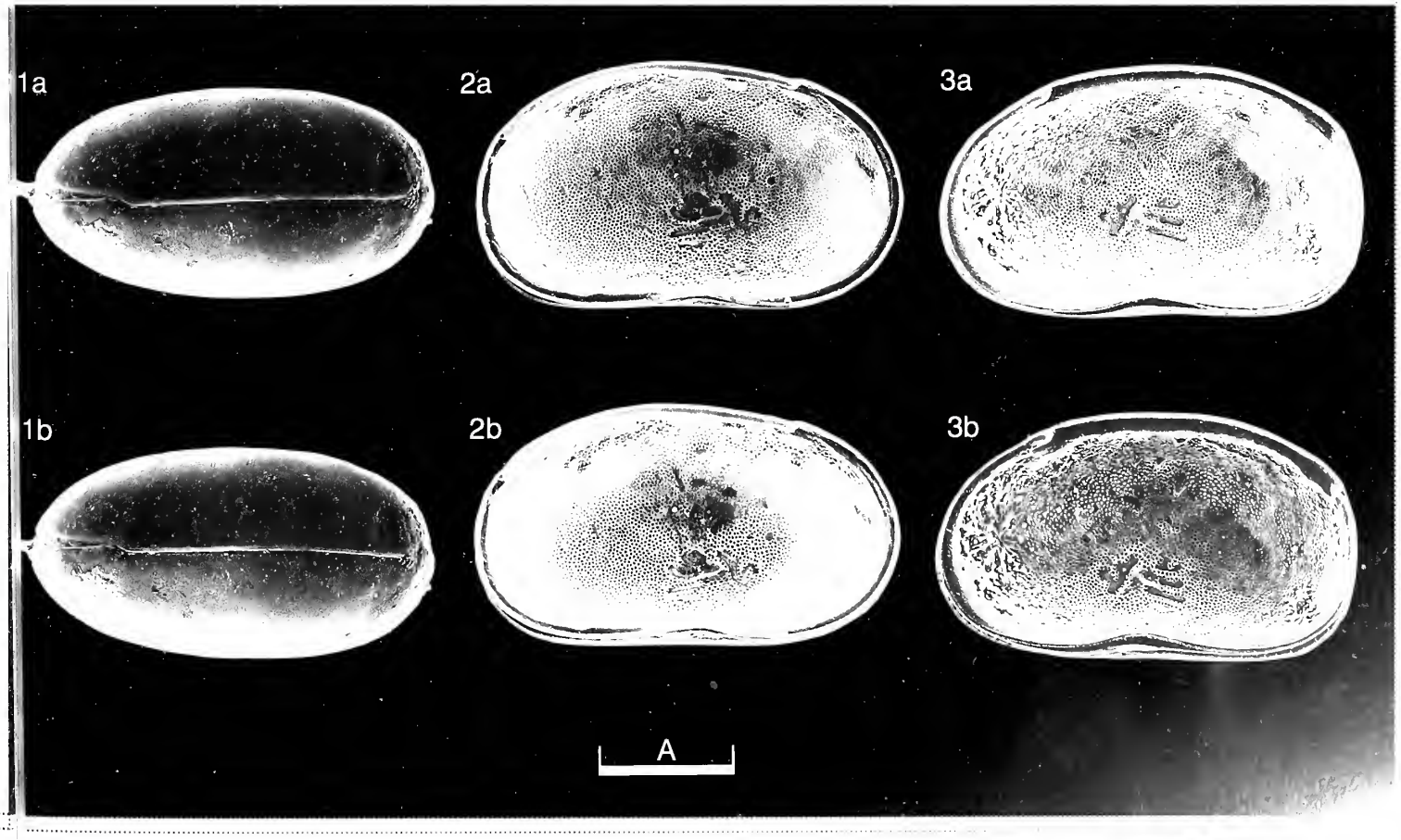
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595.337.14 (119.1) (510 : 161.114.20): 551.35 + 552.52

ON *POLYDONTOCONCHA HYPERDONTA* ZHAO & WHATLEY gen. et sp. nov.

by Zhao Quanhong & Robin C. Whatley
(Tongji University, Shanghai, China & University College of Wales, Aberystwyth, UK)

Genus *POLYDONTOCONCHA* gen. nov.
Type-species: *Polydontoconcha hyperdonta* sp. nov.

Derivation of name: Gr. *πολλη* = many + *δοντα* = teeth + *κονχη* = shell.

Diagnosis: Carapace resembling that of *Palmoconcha* Swain & Gilby, 1974. Elongate to ovate in lateral view; dorsal cardinal angles distinct, especially the posterior; dorsal margin straight; ventral margin subparallel but slightly concave anteromedianly and convex posteromedianly; anterior margin obliquely rounded; posterior margin with short caudal process medianly and truncated above. Eye spot indistinct. Surface with fine punctae medianly and weak parallel concentric ribs peripherally. Sexual dimorphism distinct with male more elongate than female. Hinge modified gongylodont: in the LV the anterior terminal element comprises 3 prominent cubic teeth; median element a strongly locellate groove; posterior terminal element a reniform socket enclosing an elongate tooth. RV hinge with complementary structures; anterior elongate socket with 3 deeper and ventrally open loculi. Inner lamella of moderate width with vestibulae at each end; radial pore canals few, short, straight and simple. Adductor scars in a semicrescentic row of 4; frontal scar single, heart-shaped.

Explanation of Plate 18, 106

Fig. 1, ♂ RV, ext. lat. (paratype, **OS 13718**, 536 μm long); Fig. 2, ♀ RV, ext. lat. (paratype, **OS 13719**, 505 μm long); Fig. 3, ♀ car., dors. (paratype, **OS 13720**, 559 μm long).
Scale A (200 μm; ×110), figs. 1–3.

Remarks: This genus clearly belongs to the family Loxoconchidae on the basis of its modified gongylodont hinge and "loxoconchid" shape. It differs from *Palmoconcha* in its additional anterior terminal teeth and locellate median element in the LV. The genus is monotypic.

Polydontoconcha hyperdonta sp. nov.

Holotype: British Museum (Nat. Hist.) no. **OS 13717**, ♀ left valve.
[Paratypes: British Museum (Nat. Hist.) nos. **OS 13718–22**].

Type locality: Shelf hole ZQ3, lat. 20° 58.05′ N, long. 114° 30.00′ E, water depth 89 m, off Guangdong Province, northern part of the South China Sea. Core samples from hole depth 96.0–96.9 m, grey silt, mid-Pleistocene.

Derivation of name: Gr. *νπερ* = beyond or very + *δοντα* = teeth, because of the large number of teeth in the hinge of this species.

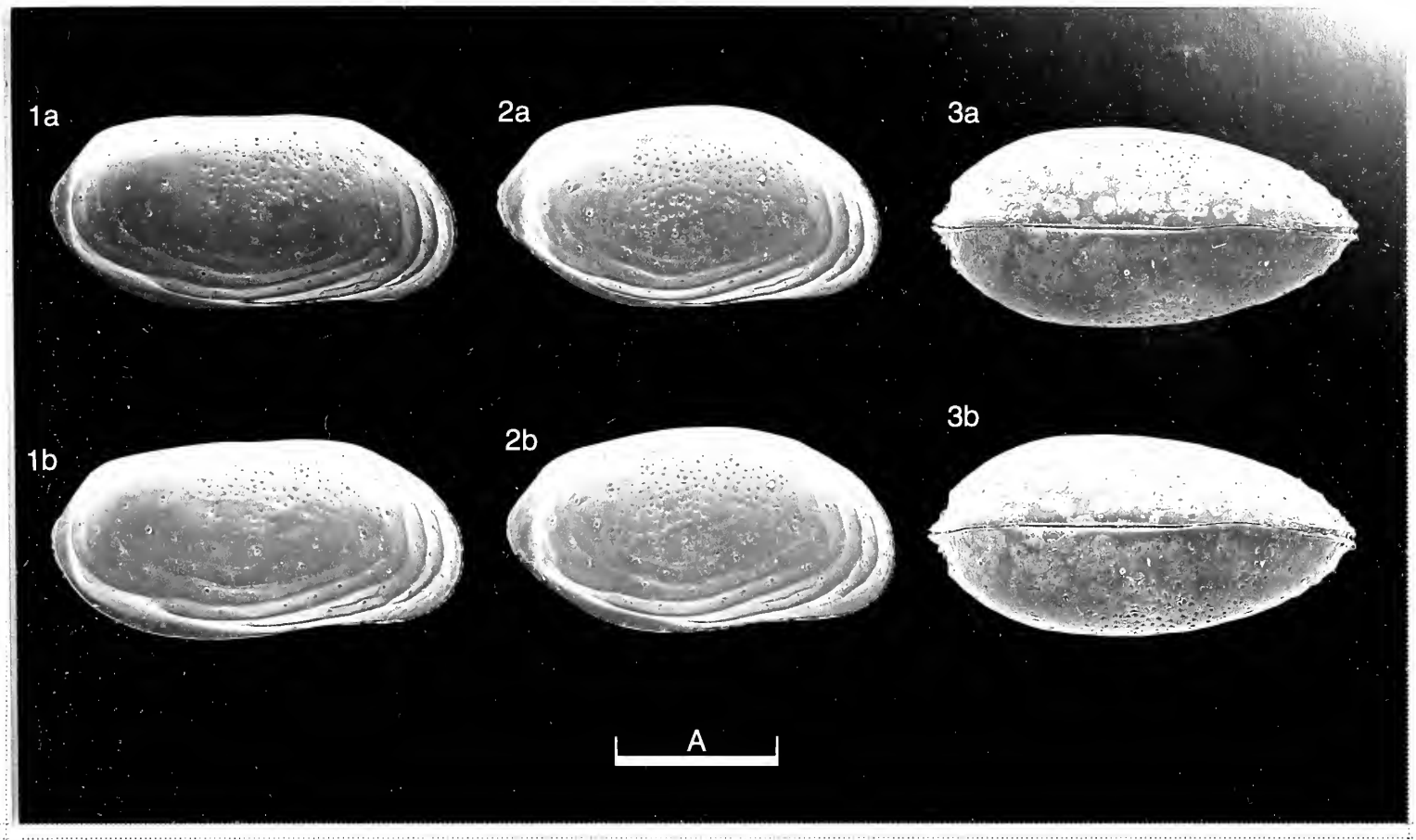
Figured specimens: British Museum (Nat. Hist.) nos. **OS 13718** (paratype, ♂ RV: Pl. **18**, 106, fig. 1), **OS 13719** (paratype, ♀ RV: Pl. **18**, 106, fig. 2), **OS 13720** (paratype, ♀ car.: Pl. **18**, 106, fig. 3), **OS 13717** (holotype, ♀ LV: Pl. **18**, 108, fig. 1), **OS 13721** (paratype, ♀ RV: Pl. **18**, 108, fig. 2), **OS 13722** (paratype, ♂ LV: Pl. **18**, 108, fig. 3); all are from the type locality.

Diagnosis: As for the genus.

Distribution: Pleistocene to Recent, northern shelf of the South China Sea. Recent specimens were recovered from two bottom samples of the South China Sea off Guangdong Province, water depth 180–220 m, fine sand.

Explanation of Plate 18, 108

Fig. 1, ♀ LV, int. lat. (holotype, **OS 13717**, 514 μm long); Fig. 2, ♀ RV, int. lat. (paratype, **OS 13721**, 555 μm long); Fig. 3, ♂ LV, ext. lat. (paratype, **OS 13722**, 550 μm long).
Scale A (200 μm; ×110), figs. 1–3.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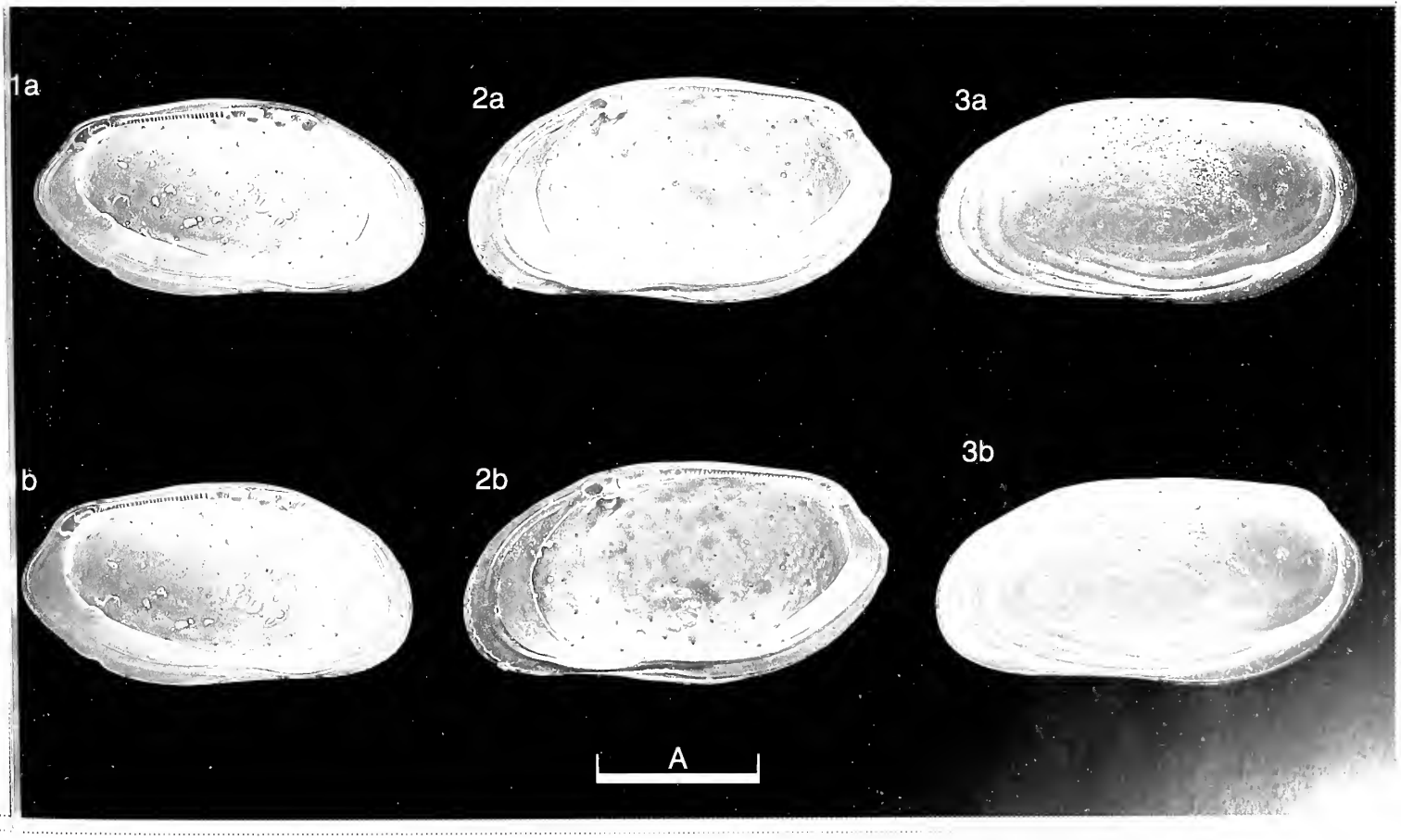
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Stereo-Atlas of Ostracod Shells 18 (27) 109–112 **(1991)**
595.337.14 (118.22) (44 : 162.002.49 + 420 : 006.50): 552.51

ON *PALMOCONCHA RUGGIERII* MAYBURY sp. nov.

by Caroline A. Maybury
(University College Wales, Aberystwyth, UK)

Palmoconcha ruggierii sp. nov.

Holotype: British Museum (Natural History), London, **OS 13755**; ♀ LV.
[Paratypes nos. **OS 13756–OS 13760**].

Type locality: Light grey, fine to medium grained sand, Le Bosq d'Aubigny (Manche), near St. Lô (approx. lat. 49°07′N, long. 01°05′W), NW France; Upper Pliocene, Redonian.

Derivation of name: In honour of Professor G. Ruggieri, in recognition of his extensive research on Tertiary to Recent, Mediterranean Ostracoda.

Figured specimens: British Museum (Natural History) nos. **OS 13755** (holotype, ♀ LV: Pl. **18**, 110, fig. 1), **OS 13756** (paratype, ♀ RV: Pl. **18**, 110, fig. 2), **OS 13757** (paratype, ♂ LV: Pl. **18**, 110, fig. 3), **OS 13758** (paratype, ♂ RV: Pl. **18**, 112, fig. 1), **OS 13759** (paratype, ♂ RV: Pl. **18**, 112, fig. 2), **OS 13760** (paratype, ♂ LV: Pl. **18**, 112, fig. 3). Paratypes **OS 13756–OS 13758** are from the type locality, but from a different sample; paratypes **OS 13759** and **OS 13760** are from a mixed sample (no. 7), Vicarage Pit, St. Erth, Cornwall, England. See J.-P. Margerel, *Les Foraminifères du Redonien, Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, **1**, 8–26, 1968 and C.A. Maybury, *Taxonomy, Palaeoecology and Biostratigraphy of Pliocene Benthonic Ostracoda from St. Erth and NW France*, unpub. PhD thesis, Univ. Wales, **1**, 3–6, 1985 for further details of the French and British samples, respectively.

Explanation of Plate 18, 110

Fig. 1, ♀ LV, ext. lat. (**OS 13755**, 480 μm long); Fig. 2, ♀ RV, ext. lat. (**OS 13756**, 500 μm long); Fig. 3, ♂ LV, ext. lat. (**OS 13757**, 470 μm long).
Scale A (100 μm; ×136), figs. 1–3.

Diagnosis: A small, subelliptical species of *Palmoconcha*. Anterior margin asymmetrically rounded; posterior margin almost caudate; dorsal margin arcuate in ♀ LV, oblique in ♀ RV and ♂ LV and slightly concave medianly in ♂ RV. Ventral margin curved anteriorly and posteriorly, with very slight oral incurvature. Smooth marginal rim narrowest orally. Lateral surface punctate with punctae becoming smaller and more densely distributed peripherally. Pore conuli prominent just at the anterior and posterior edges of the tumid region of each valve. Eye spot large and smooth; selvage blade-like orally. Hinge and muscle scars typical of the genus.

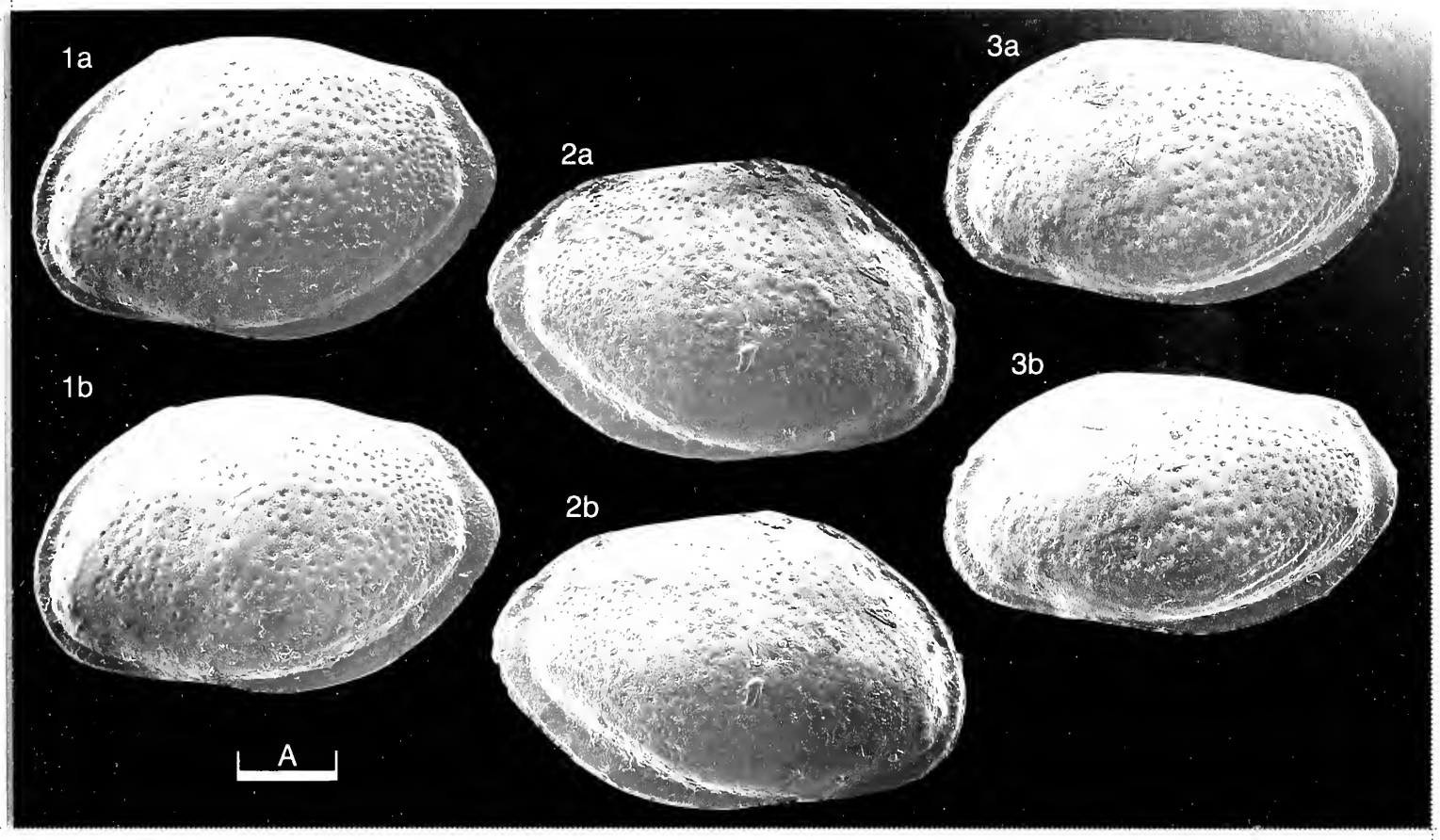
Remarks: Ruggieri (pers. comm.) has compared the present material with a similar species: *Palmoconcha subrugosa* (Ruggieri) (G. Ruggieri, *Boll. Soc. paleont. ital.*, **15**(2), 184, 1976) and concludes that the two are different, especially with respect to their outlines; *P. subrugosa* being subrectangular and *P. ruggierii*, subelliptical. The present species is also more inflated anteriorly and smaller: males of *P. subrugosa* are 570–580 μm in length and the female 565 μm (see *Loxoconcha* aff. *L. agilis* Ruggieri, 1967 (G. Bonaduce, G. Ciampo & M. Masoli, *Pubbl. Staz. zool. Napoli*, **40**, 102, 1975) which has been assigned to *P. subrugosa* by Ruggieri (*op. cit.*)). Specimens of *P. subrugosa* from the Italian Quaternary kindly sent by Ruggieri have enabled me to concur with this opinion. Ruggieri notes that the males of *P. ruggierii* are similar to an unpublished species of *Palmoconcha* from the late Miocene of Tunisia. Again the difference between the two is in the outline: the unpublished species is higher anteriorly than *P. ruggierii*.

Aruta, 1966 (*Riv. Miner. Sicil.*, **17**, 203, pl. 1, fig. 8) described a *Loxoconcha ruggierii* from the late Miocene of Sicily; this is a true *Loxocorniculum*, highly reticulate with posterodorsal and posteroventral protuberances.

Distribution: In addition to its occurrence in two samples from the type locality, this species has also been found in Redonian (Upper Pliocene) deposits from Apigné (Le Temple du Cerisier) and Palluau II, NW France and late Pliocene deposits from St. Erth, England (sample nos. 1–3, 7, 10, 12–14, 16–17, 21, 23, 25–29).

Explanation of Plate 18, 112

Fig. 1, ♂ RV, ext. lat. (**OS 13758**, 480 μm long); Fig. 2, ♂ RV, int. lat. (**OS 13759**, 480 μm long); Fig. 3, ♂ LV, int. musc. sc. (**OS 13760**, 470 μm long).
Scale A (100 μm; ×136), figs. 1, 2; scale B (10 μm; ×640), fig. 3.


1a
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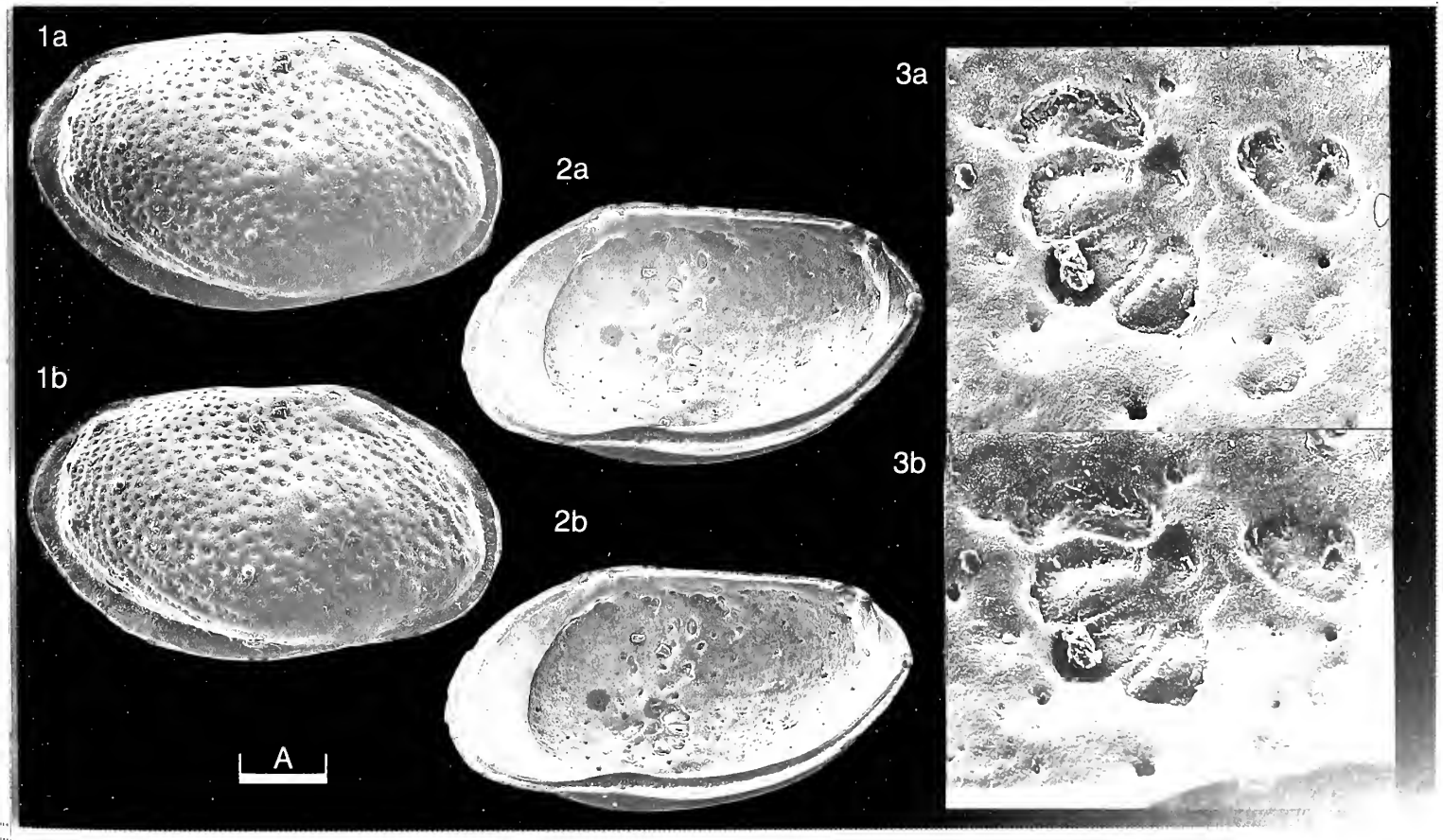

1a
3a
2a
1b
3b
2b
A

595.337.14 (116.14) (420:162.003.51+003.53): 551.351+552.52

ON *EKTYPHOCYTHERE COOKIANA* (ANDERSON)

by Ian Boomer
(University of East Anglia, Norwich)

Ektyphocythere cookiana (Anderson, 1964)

1964 *Klinglerella? cookiana* sp. nov. F.W. Anderson, *Bull. geol. Surv. Gt Br.*, **21**, 143, pl. 9, figs. 16, 17, pl. 15, fig. 122.

Holotype: British Geological Survey (Keyworth) **GSM Mik (j) 276001**. ♀ carapace.

Type locality: Plattlane Borehole, Whixall, Shropshire (Grid Ref. SJ 5140 3645). Westbury Formation, "Lower Rhaetic", at a depth of 243′0″ to 243′6″.

Figured specimens: British Geological Survey (Keyworth) no. **GSM Mik (j) 276001** (holotype, car.: Pl. **18**, 114, fig. 3). Bristol City Museum and Art Gallery (**BRSMG**) no. **Ce17020** (LV: Pl. **18**, 114, fig.1), **Ce17021** (LV: Pl. **18**, 114, fig. 2), **Ce17022** (car.: Pl. **18**, 114, fig. 4), **Ce17023** (RV: Pl. **18**, 116, figs. 1, 2), **Ce17024** (car.: Pl. **18**, 116, figs. 3, 4). All specimens (apart from holotype) are from uppermost bed of the Westbury Formation, Penarth Group at Hampstead Farm Quarry, Avon (Grid Ref. ST 726 839) (*sensu* D.T. Donovan *et al.*, *Palaeontology*, **32**, 231, 1989); collected by M. T. Curtis, to whom thanks are due for making them available to the author.

Explanation of Plate 18, 114

Fig. 1, LV, ext. lat. (**BRSMG Ce17020**, 500 μm long); Fig. 2, LV, int. lat. (**BRSMG Ce17021**, 462 μm long); Fig. 3, car., ext. lt. lat. (holotype, **GSM Mik (j) 276001**, 487 μm long); Fig. 4, car., ext. rt. lat. (**BRSMG Ce17022**, 538 μm long).
Scale A (100 μm; ×100), figs. 1–4.

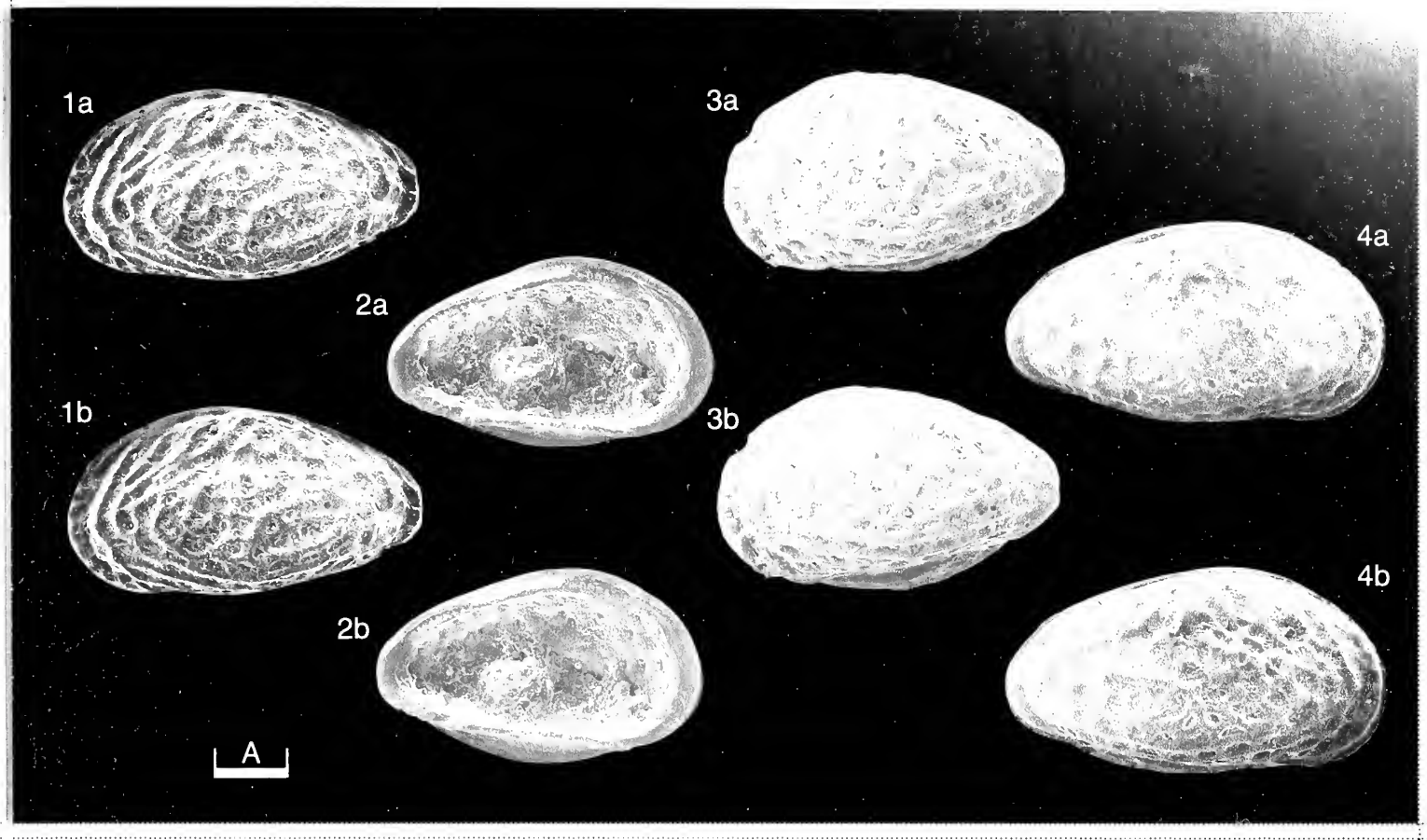
Diagnosis: Carapace small (LV > RV), inflated ventro-laterally, outline sub-oval in lateral view tapering to a narrowly rounded posterior margin. Anterior margin well rounded. Both anterior and posterior margins compressed, the former bearing 6–8 and the latter 3–4 short radial ribs. Greatest height in front third of valve. External ornamentation comprises coarse longitudinal ribs on ventral and ventro-lateral surfaces, lateral surfaces possess well developed coarse anastomosing ribs, forming a weak reticulation. Hinge antimerodont, adductor muscle scars not visible, inner lamellae of moderate width anteriorly and posteriorly, no vestibula observed, marginal pore canals appear few and simple although indistinct. Sexual dimorphism not apparent although the holotype would appear to be somewhat smaller than the material from Avon.

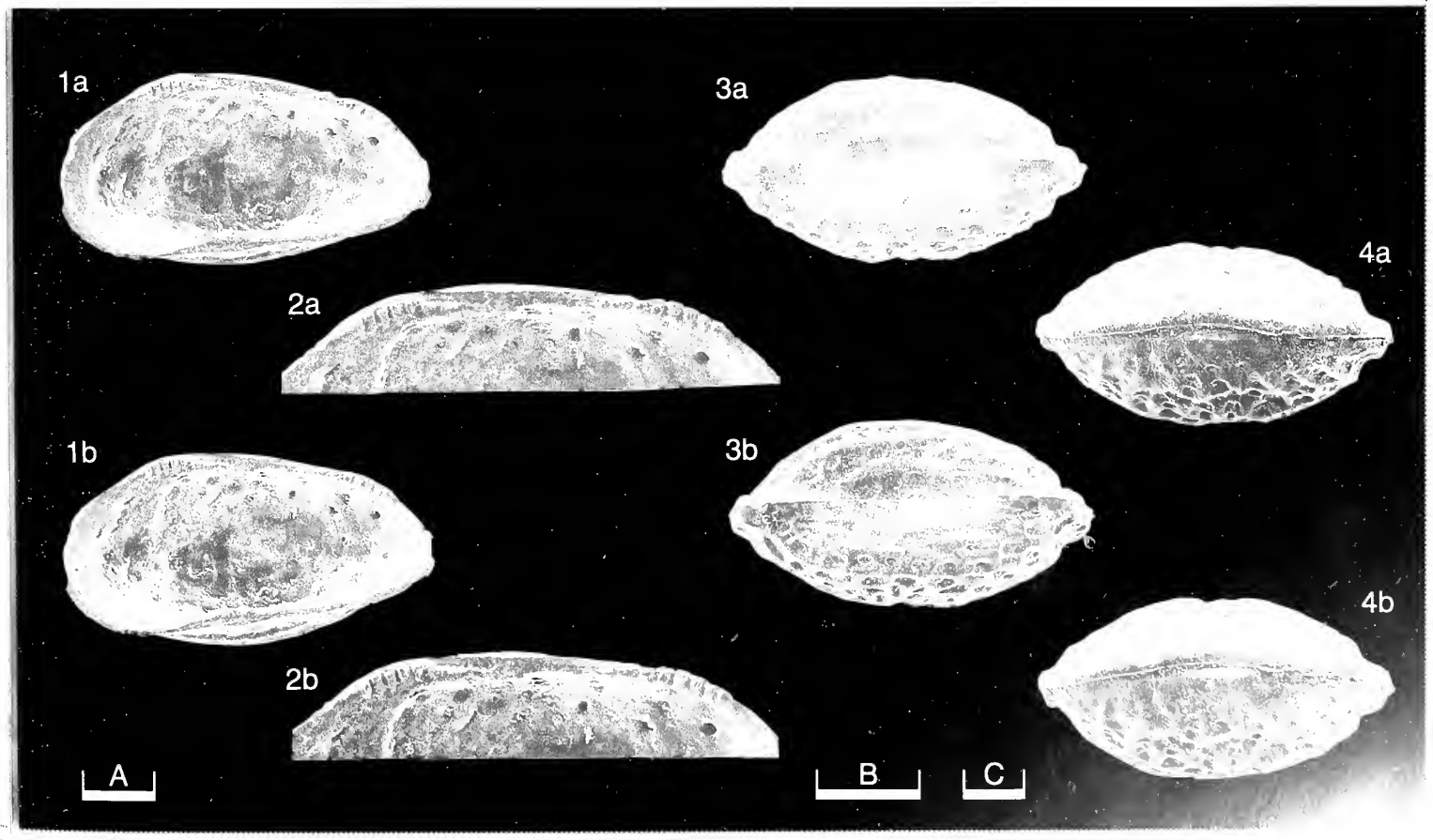
Remarks: This species represents one of the earliest representatives of the genus *Ektyphocythere* Bate, 1963 (*Bull. Br. Mus. nat. Hist.* (Geol.) **8**, 213). It appears to have a limited geographical and stratigraphical distribution.

Distribution: Rhaetian (late Triassic) of the English Midlands (Anderson, 1964) and Avon, SW England (this study).

Explanation of Plate 18, 116

Fig. 1, RV, int. lat. (**BRSMG Ce17023**, 526 μm long); Fig. 2, RV, detail of hingement (**BRSMG Ce17023**); Fig. 3, car., ext. vent. (**BRSMG Ce17024**, 551 μm long); Fig. 4, car., ext. dors. (**BRSMG Ce17024**).
Scale A (100 μm; ×100), fig. 1; scale B (100 μm; ×145); scale C (100 μm; ×95), figs. 3, 4.


1a
3a
4a
2a
1b
3b
4b
2b
A


1a
3a
4a
2a
1b
3b
4b
2b
A
B
C

595.337.14 (116.333.3) (662.6 : 162.016.11): 551.35

ON *TETHYSOBUNTONIA GOVOROFFI* COLIN & BABINOT gen. et sp. nov.

by Jean-Paul Colin & Jean-François Babinot
(Esso Rep, Bègles & Université de Provence, Marseille, France)

Genus *TETHYSOBUNTONIA* gen. nov.
Type-species: *Tethysobuntonia govoroffi* sp. nov.

Derivation of name: Tethyan representative of the subfamily Buntoniinae.

Diagnosis: A genus of the sub-family Buntoniinae with a distinct sub-central tubercle surrounded by a sub-circular depression. Small denticles occur along the anterior margin. Ventral margin typically depressed into selvage area, especially on the right valve. Carapace surface smooth or irregularly pitted. Hinge amphidont (heterodont). Marginal zone moderately wide, without vestibulum. Very pronounced sexual dimorphism with males being much larger and more elongate than females.

Remarks: *Tethysobuntonia* differs from other representatives of the sub-family Buntoniinae as defined by Apostolescu (*Revue Inst. fr. Pétrole*, **16**(7–8), 1961), by the presence of a well developed sub-central tubercle.

Tethysobuntonia govoroffi sp. nov.

1956 *Eobuntonia? curta* n. sp. A.S. Sayyab, *Cretaceous Ostracoda from the Persian Gulf Area*, Unpubl. Thesis, College State Univ. Iowa, 109–111, text-fig. 2N, pl. 5, figs. 5, 11, 21.
1973 *Buntonia* sp. B 816, Y. Bellion, P. Donze & R. Guiraud, *Publs Serv. Carte géol. Algér.*, **44**, 20, pl. 5, figs. 6–11.
1988 "*Eobuntonia cf. curta*" Sayyab; J. Athersuch, *in* T. Hanai, N. Ikeya & K. Ishizaki (eds.), *Evolutionary Biology of Ostracoda*, Elsevier, Amsterdam, 1189, 1191, 1197, pl. 1, fig. 17 only (*non* fig. 18).

Explanation of Plate 18, 118

Fig. 1, ♂ LV, ext. lat. (paratype, **PCA 1/1**, 559 μm long); Fig. 2, ♂ LV, int. lat. (paratype, **PCA 1/2**, 593 μm long); Fig. 3, ♂ car. ext. rt. lat. (holotype, **HCA 1**, 602 μm long).
Scale A (100 μm; ×93), figs. 1–3.

Holotype: Centre de Sédimentologie-Paléontologie, Université de Provence, Centre Saint-Charles, Marseille, no. **HCA 1**, ♂ carapace.
[Paratypes; nos. **PCA 1/1–PCA 1/7**; 3 carapaces and 4 valves].

Type locality: Aschia-Tinamou water well, 45 km WSW of South Termit Massif, eastern Niger Republic, lat. 11° 05′ N, long. 15° 27′ W (H. Faure, *Mém. Bur. Rech. géol. minièr.*, **47**, 1966; J. Greigert & R. Pougnet, *Ibid.*, **48**, 1967). Upper part of the Aschia-Tinamou Formation, Campanian, Upper Cretaceous.

Figured specimens: Centre de Sédimentologie-Paléontologie, Université de Provence, Centre Saint-Charles, Marseille, coll. nos. **PCA 1/1** (paratype, ♂ LV: Pl. **18**, 118, fig. 1), **PCA 1/2** (paratype, ♂ LV: Pl. **18**, 118, fig. 2), **HCA 1** (holotype, ♂ car.: Pl. **18**, 118, fig. 3), **PCA 1/3** (paratype, ♀ car.: Pl. **18**, 120, fig. 1), **PCA 1/4** (paratype, ♀ car.: Pl. **18**, 120, fig. 2), **PCA 1/5** (paratype, ♂ car.: Pl. **18**, 120, fig. 3), **PCA 1/6** (paratype, ♀ LV: Pl. **18**, 120, fig. 4), **PCA 1/7** (paratype, ♀ LV: Pl. **18**, 120, fig. 5). All from the type locality.

Derivation of name: In honour of Dr. N. Govoroff (Esso Exploration West Africa, Libreville, Gabon) who collected and sent us the samples.

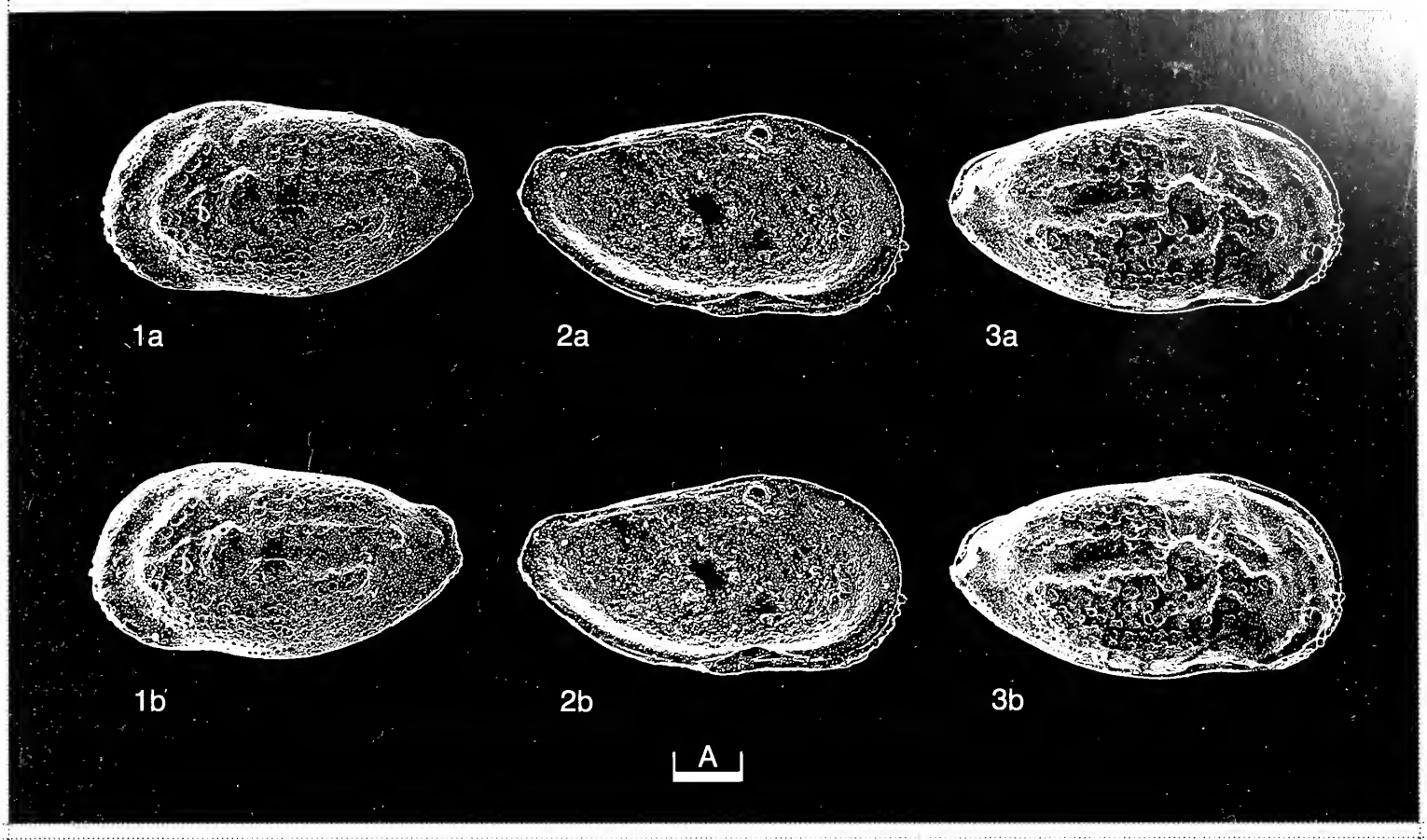
Diagnosis: As for the genus. The genus *Tethysobuntonia* is currently monotypic.

Distribution: Known from the Campanian of the Niger Republic (outcrops and subsurface), the Middle Campanian to Early Maastrichtian of Algeria (Bellion *et al.* 1973, *op. cit.*), Upper Cretaceous of Saudi Arabia (Sayyab, 1956, *op. cit.*), Campanian–Early Maastrichtian of Oman, Coniacian?–Campanian of Iraq and Coniacian–Santonian of Ethiopia (Athersuch, 1988, *op. cit.*).

Acknowledgements: We sincerely thank Drs. N. Govoroff (Libreville, Gabon) for sending us the material to study, P. Donze (Lyon, France) for the loan of the Algerian material and J. Athersuch (British Petroleum plc) for access to Sayyab's thesis.

Explanation of Plate 18, 120

Fig. 1, ♀ car., ext. rt. lat. (paratype, **PCA 1/3**, 473 μm long); Fig. 2, ♀ car., ext. vent. (paratype, **PCA 1/4**, 452 μm long); Fig. 3. ♂ car., ext. dors. (paratype, **PCA 1/5**, 559 μm long); Fig. 4, ♀ LV, int. lat. (paratype, **PCA 1/6**, 441 μm long); Fig. 5, ♀ LV, ext. lat. (paratype, **PCA 1/7**, 441 μm long).
Scale A (100 μm; ×93), figs. 1–5.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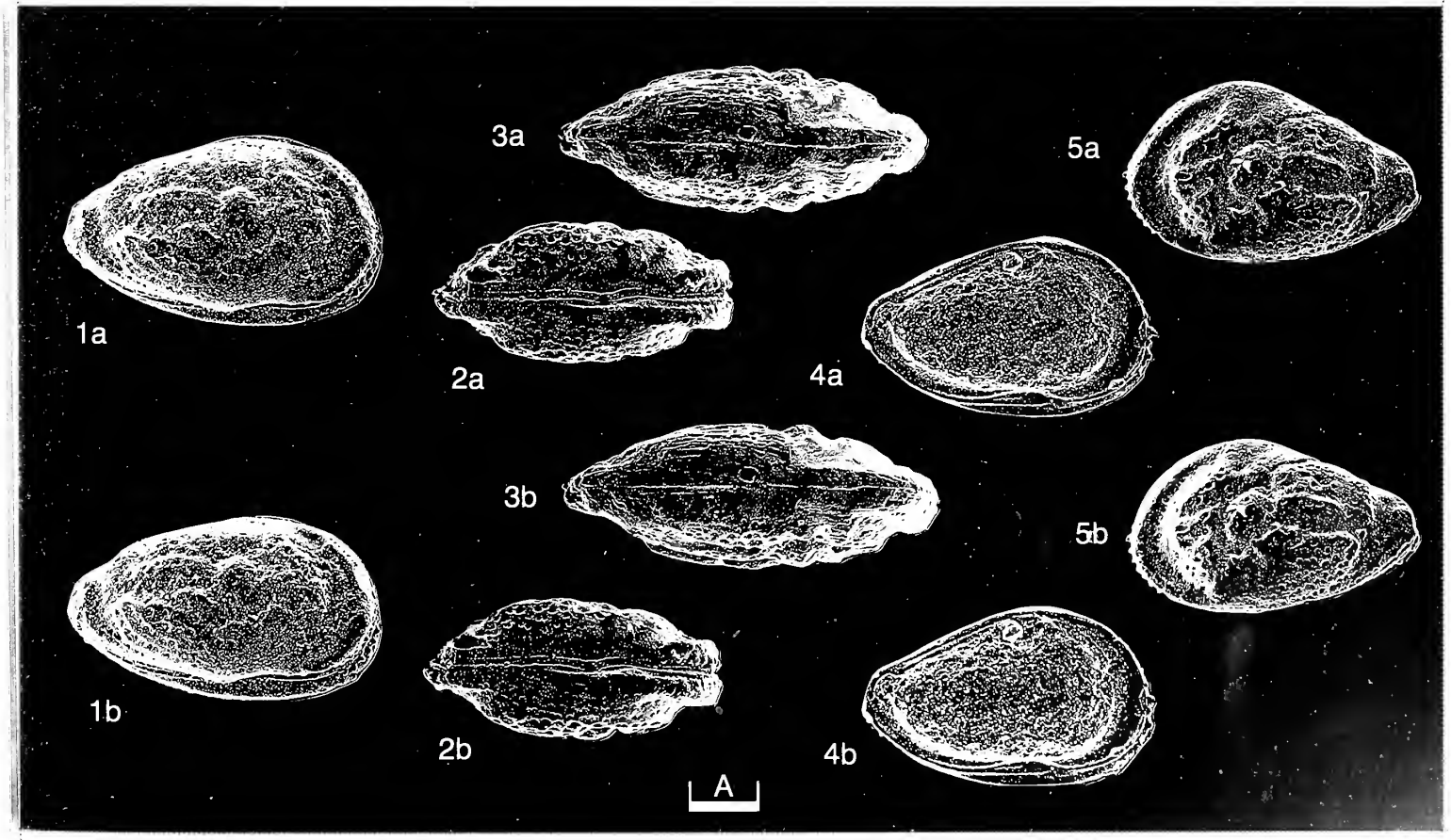
3a
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5b
1b
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4b
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595.337.2 (116.14) (420 : 162.003.51 + 003.53): 551.351 + 552.52

ON *OGMOCONCHELLA MARTINI* (ANDERSON)

by Ian Boomer
(University of East Anglia, Norwich)

Ogmoconchella martini (Anderson, 1964)

1951 Ostracode 800, C.A. Wicher, *Erdöl u. Kohle*, **4**, 759, pl. 1, figs. 12, 13.
1964 *Hungarella martini* sp. nov., F.W. Anderson, *Bull. geol. Surv. Gt. Br.*, **21**, 147, pl. 13, figs. 83–89.
1969 *Healdia? tenuivirgata* sp. nov., H.J. Will, *Beih. geol. Jb.*, **54**, 52, pl. 1, figs. 2a–d.
1980 *Hungarella? reticulata* sp. nov., E. Kristan-Tollmann, *Mitt. öst. geol. Ges.*, **73**, 197, pl. 11, figs. 12–15, pl. 12, figs. 15, 16.

Holotype: British Geological Survey (Keyworth) **GSM Mik (j) 280001**, ♀ carapace.

Type locality: Plattlane Borehole, Whixall, Shropshire (Grid Ref. SJ 5140 3645). Westbury Formation, "Lower Rhaetic" at a depth of 243′0″ to 243′6″.

Figured specimens: British Geological Survey (Keyworth) **GSM Mik (j) 280001** (holotype, ♀ car.: Pl. **18**, 122, figs. 2, 3, Pl. **18**, 124, fig. 1); Bristol City Museum and Art Gallery **(BRSMG)** nos. **Ce17025** (♀ LV: Pl. **18**, 122, fig. 1), **Ce17026** (♀ LV: Pl. **18**, 124, fig. 2), **Ce17027** (♀ car.: Pl. **18**, 124, fig. 3), **Ce17028** (♂ car.: Pl. **18**, 124, fig. 4). All specimens (apart from holotype) are from uppermost bed of the Westbury Formation, Penarth Group at Hampstead Farm Quarry, Avon (Grid Ref. ST 726 839) (*sensu* D.T. Donovan *et al.*, *Palaeontology*, **32**, 231, 1989); collected by M. T. Curtis, to whom thanks are due for making them available to the author.

Explanation of Plate 18, 122

Fig. 1, ♀ LV, ext. lat. (**BRSMG Ce17025**, 513 μm long); Figs. 2, 3, ♀ car. (holotype, **GSM Mik (j) 280001**, 538 μm long), fig. 2, lt. lat., fig. 3, rt. lat.
Scale A (100 μm; ×100), figs. 1, 3; scale B (100 μm; ×105), fig. 2.

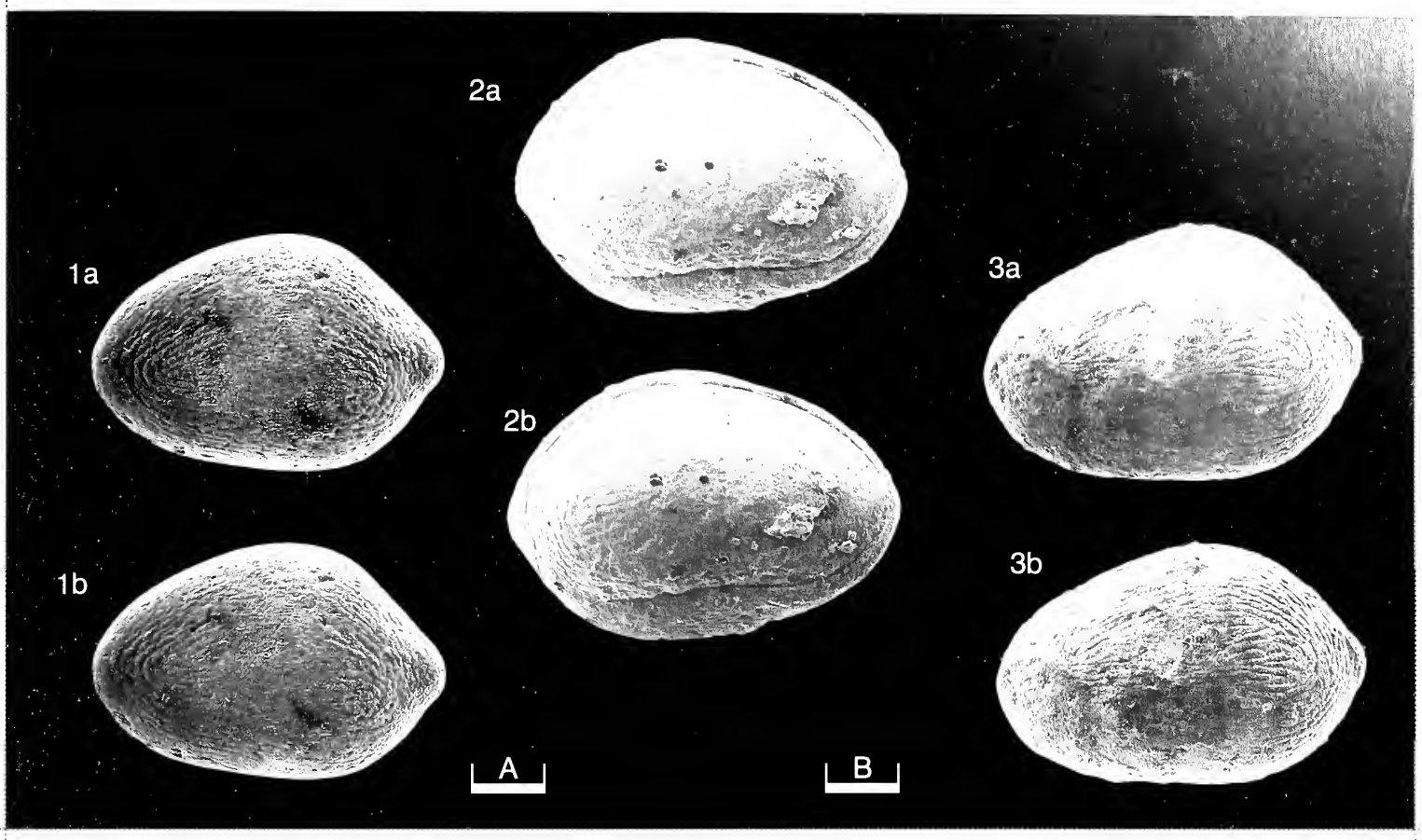
Diagnosis: Distinguished from similar, contemporary metacopine Ostracoda by the presence of short rounded process at mid-height on the posterior of the larger left valve. Overlap entire (LV > RV), strong in lateral view particularly along posterior and ventral margins. Greatest height behind mid-length, anterior extremity below mid-height in both valves especially in more tumid left valve. External lateral surfaces possess fine "fingerprint" sculpture arranged concentrically around postero-mid valve area. Muscle scar pattern not observed. Hinge consists of deep contact groove in left valve finely crenulated along dorsal margin and without distinct terminal widenings.

Remarks: In the original description of this species, Anderson (*op. cit.*) commented on the presence of the fine ornament as distinguishing it from other species of the genus. However, the current author has also recorded such ornament, although often much reduced, in *Ogmoconchella aspinata* (Drexler, 1958), *Ogmoconchella aequalis* (Herrig, 1969), *Ogmoconchella adenticulata* (Pietrzenuk, 1964), *Ogmoconchella mouhersensis* (Apostolescu, 1961) and *Ogmoconchella propinqua* Malz, 1971. The presence of such ornament will be strongly dependent upon the state of preservation. This feature cannot, therefore, be meaningfully described as characteristic of this or any other metacopine species.

Distribution: Recorded from the Rhaetian (late Triassic) deposits of Germany (Wicher, 1951; Will, 1969), Great Britain (Anderson. 1964; this work) and Iran (Kristan-Tollmann, 1980).

Explanation of Plate 18, 124

Fig. 1, ♀ car. (holotype, **GSM Mik (j) 280001**), detail of posterior process and ornament; Fig. 2, ♀ LV, int. lat. (**BRSMG Ce17026**, 526 μm long); Fig. 3, ♂ car., ext. dors. (**BRSMG Ce17027**, 513 μm long); Fig. 4, ♀ car., ext. dors. (**BRSMG Ce17028**, 487 μm long).
Scale A (50 μm; ×200), fig. 1; scale B (100 μm; ×100), figs. 2, 4; scale C (100 μm; ×105), fig. 3.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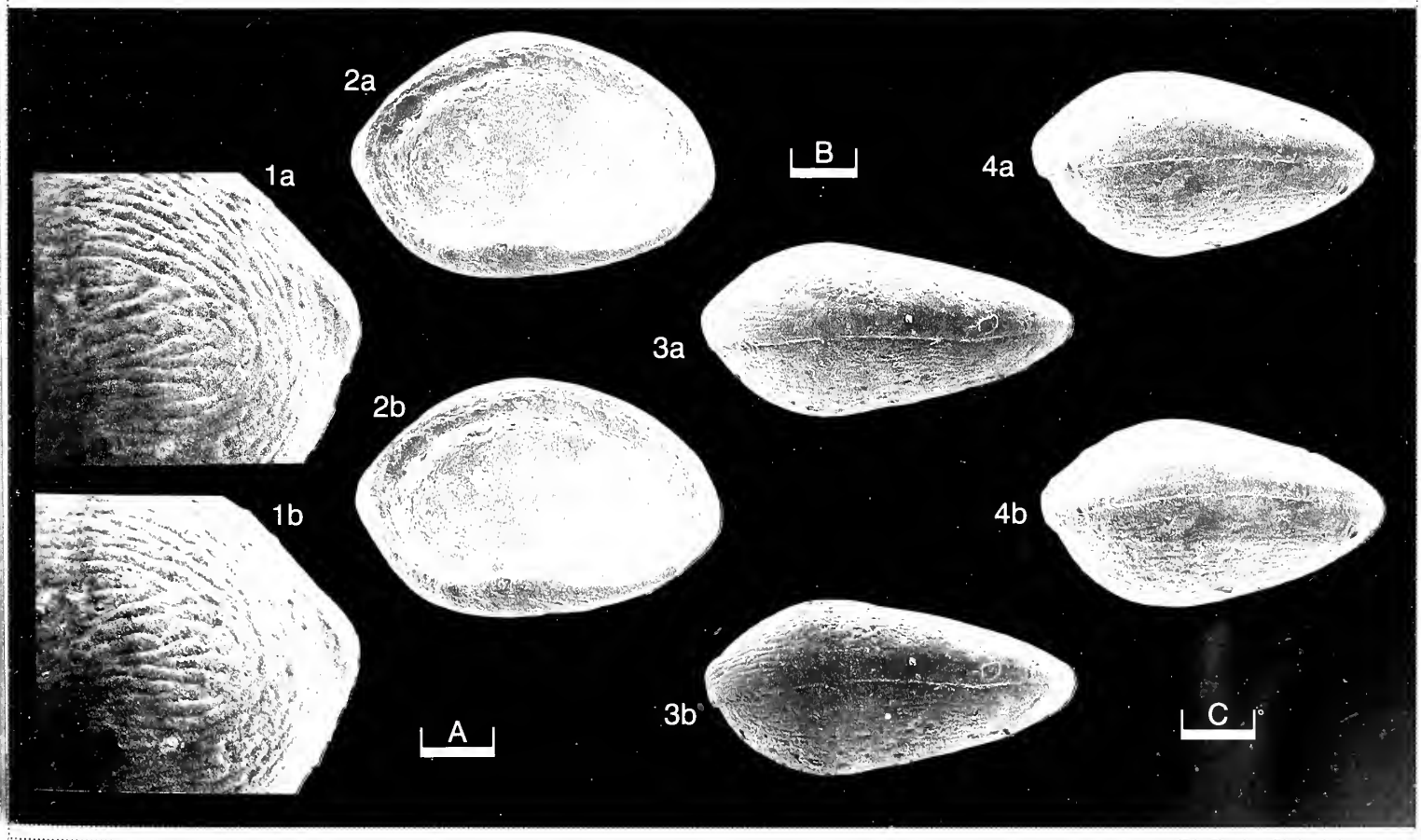
2a
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3b
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C

595.336.11 (113.333) (420 : 162.003.52 + 430 : 161.013.52/012.54 + 438.161.017.54 + 485 : 161.013.55): 551.351 + 552.51 + 552.54

ON *FROSTIELLA GROENVALLIANA* MARTINSSON

by Wolfgang Hansch, David J. Siveter & C. Giles Miller
(University of Greifswald, Germany & University of Leicester, England)

Genus *FROSTIELLA* Martinsson, 1963
Type-species (by original designation): *Frostiella groenvalliana* Martinsson, 1963

Diagnosis: Kloedeniinae with crumina strongly assimilated with the domicilum; crumina with a narrow, striate, and somewhat swollen field between the distinct velar bend and the marginal structure. Syllobium with protruding cusp (after Martinsson 1963).

Remarks: This beyrichiacean genus also currently includes *F. pliculata* Martinsson, 1963; *F. cornuta* Martinsson, 1965; *F. loodensis* Sarv, 1968; *F. bicristata* Shaw, 1969; and *F. modesta* Abushik, 1971. *Frostiella* is traditionally regarded as of Upper Silurian Přídolí Series (cf. Martinsson 1963) age but may possibly also occur in the top of the Ludlow Series (e.g. see Siveter 1989 and below).

Frostiella groenvalliana Martinsson, 1963

1897 *Kloedenia wilckensiana* Jones; K.A. Grönwall, *Sver. geol. Unders. Afh.*, ser. C, **170** (*passim*).
1909 *Kloedenia wilckensiana* Jones et var. *plicata* Jones; J.Ch. Moberg & K.A. Grönwall, *Acta Univ. lund.*, ser. 2, **5**, 1, 66–67, pl. 6, figs. 6, 7.
1963 *Frostiella groenvalliana* n. sp., A. Martinsson, *Bull. geol. Instn Univ. Uppsala*, **42**(2), 29–33, figs. 7C, 8, 14, 15A, 15B, 16A, 16B, 17A–F.
1963 *Frostiella* cf. *groenvalliana*; A. Martinsson, *Ibid.*, 34, figs. 18A–D.

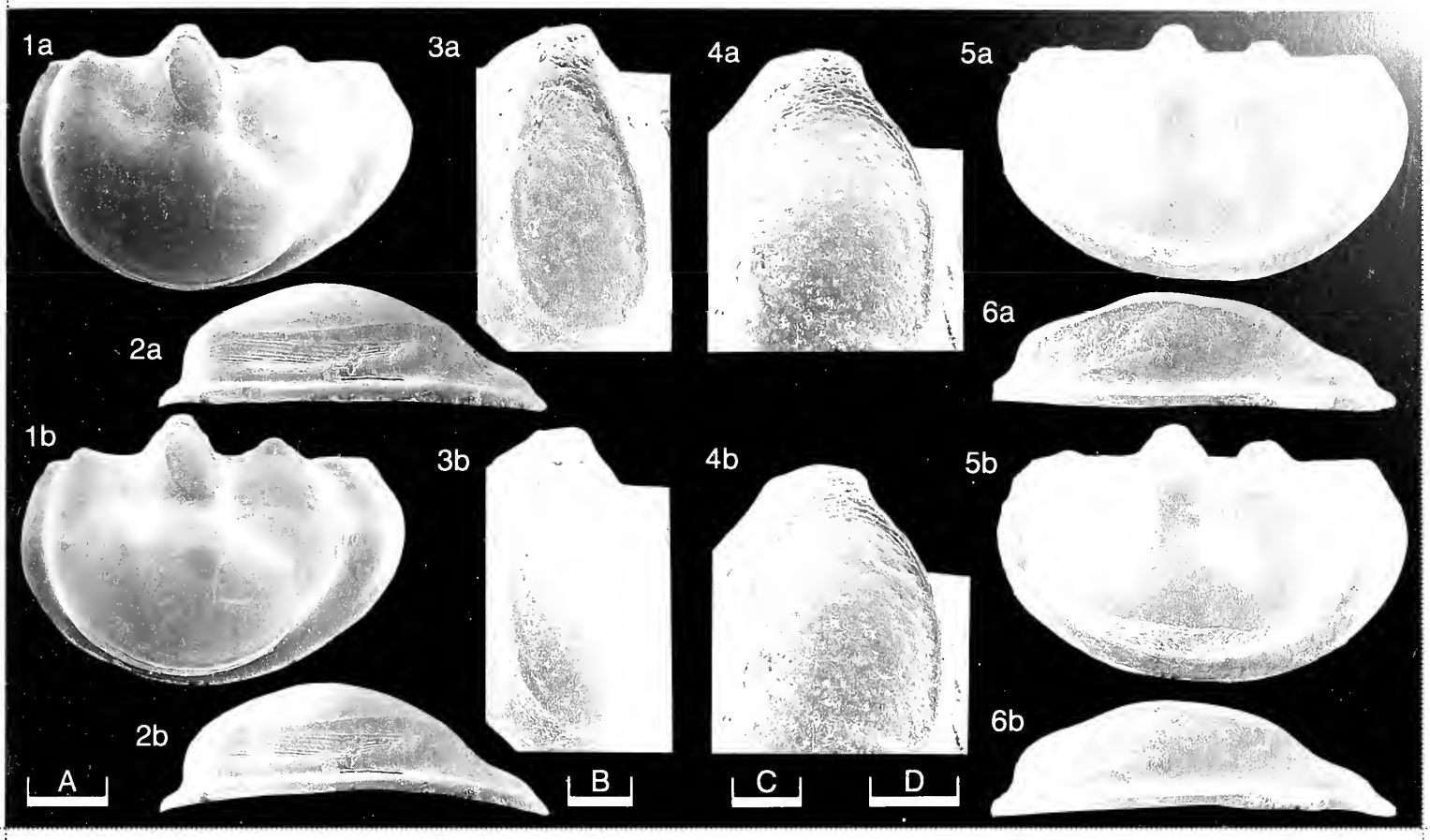
Explanation of Plate 18, 126

Figs. 1–3, ♀ LV (**LO 2183T**, 2440 μm long): fig. 1, ext. lat.; fig.2, ext. vent.; fig. 3, detail of preadductorial lobe. Figs. 4–6, ♂ LV (**LO 2184T**, 2400 μm long): fig. 4, detail of preadductorial lobe; fig. 5, ext. lat.; fig. 6 ext. vent.
Scale A (500 μm; ×23), figs. 1, 2; scale B (150 μm; ×60), fig. 3; scale C (125 μm; ×72), fig. 4; scale D (500 μm; ×24), figs. 5, 6.

1963 *Frostiella* aff. *groenvalliana*; A. Martinsson, *Ibid.*, 34.
1964 *Frostiella lebiensis* n. sp., A. Martinsson, *Geol. För. Stockh. Förh.*, **86**(2), 139–142, 155–156, 158, figs. 8A–D, text-fig. 15.
1967 *Frostiella groenvalliana*; A. Martinsson, *Geol. För. Stockh. Förh.*, **89**(3), 376, 377, 379, text-figs. 2, 3.
1967 *Frostiella lebiensis* Martinsson; L. Gailite, *in*: L. Gailite, *et al.*, *Stratigrafija, fauna i uslovija obrazovania silurijskich porod sredney Pribaltiki*, 143, pl. 10, fig. 13, Riga (Zinatne).
1968 *Frostiella groenvalliana* Martinsson; L. Sarv, *Ostrakody Craspedobolbinidae, Beyrichiidae, Primitiopsidae silura Estonii*, 58, pl. 20, figs. 6–8, Tallinn (Valgus).
1969 *Frostiella groenvalliana* Martinsson; R.W.L. Shaw, *Geol. För. Stockh. Förh.*, **91**(1), 55, 65, 67, 68, 70, figs. 1A–F, text-fig. 8.
1970 *Frostiella groenvalliana* Martinsson; L. Sarv, *in*: D. Kaljo (Ed.), *Silur Estonii*, 159, 169, tab. 18, Tallinn (Valgus).
1971 *Frostiella groenvalliana* Martinsson; R.W.L. Shaw, *Palaeonotology*, **14**(4), 603, pl. 113, figs. 1–5, 7.
1971 *Frostiella groenvalliana* Martinsson; L. Sarv, *Eesti NSV Tead. Akad. Toim.*, Khim. Geol., **20**(4), 353–355, text-fig. 2.
1974 *Frostiella groenvalliana* Mart.; L. Gailite & R. Ulste, *in*: *Regional'naja geologija Pribaltiki*, 40–41, text-fig. 1, Riga (Zinatne).
1974 *Frostiella lebiensis* Martinsson; E. Tomczykowa & E. Witwicka, *Biul. Inst. geol.*, **276**, 58–59, 63, text-fig. 2.
1976 *Frostiella groenvalliana* Martinsson; D. Kaljo & L. Sarv, *Eesti NSV Tead. Akad. Toim.*, Khim. Geol., **25**(4), 328.
1976 *Frostiella lebiensis* Martinsson; *Ibid.*, 326, 328–329.
1977 *Frostiella groenvalliana* Martinsson; A. Martinsson, *in*: A. Martinsson (Ed.), *The Siluro-Devonian Boundary*, IUGS ser. A, no. 5, 46, 48, 49, 327–329, fig. 1, text-fig. 3.
1977 *Frostiella groenvalliana* Martinsson; L. Sarv, *in*: D. Kaljo (Ed.), *Fazii i fauna silura Pribaltiki*, 166, ?171, 173, 175, ?text-fig. 7, Tallinn (Valgus).
1977 *Frostiella* sp. cf. *F. groenvalliana* Martinsson; M.J. Copeland & J.M. Berdan, *Geol. Surv. Pap. Can.*, **77–1B**, pl. 2.3, fig. 19.
1978 *Frostiella groenvalliana* Martinsson; D.J. Siveter, *in*: R. Bate & E. Robinson (Eds.), *Geol. J.*, (Special Issue) **8**, 68, 86, pl. 9, figs. 7, 8, tab. 2.
1978 *Frostiella groenvalliana* Mart.; L. Gailite, *in*: *Stratigrafija fanerozoja Pribaltiki*, 13, 15, 18, 19, Riga (Zinatne).
1978 *Frostiella groenvalliana* Martinsson; D. Kaljo, *Eesti NSV Tead. Akad. Toim.*, Geol., **27**(1), 7–9.
1978 *Frostiella groenvalliana* Martinsson; D.E. White & B.C. Coppack, *Bull. geol. Surv. Gt. Br.*, **62** (for 1977), 30, pl. 1, figs. 10–12.
1982 *Frostiella groenvalliana* Martinsson; M.G. Bassett *et al.*, *Lethaia*, **15**(1), 8, 15–18, text-fig. 6.
1982 *Frostiella groenvalliana* Martinsson; I.J. Paskevicius, *Geologija*, **3**, 20, 44, 46, 47, text-fig. 1.

Explanation of Plate 18, 128

Figs. 1–3, ♀ RV (**SGWG 90/1**, approx. 2250 μm long): fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, detail of preadductorial lobe. Figs. 4–6, ♂ RV (**SGWG 90/2**, approx. 2100 μm long): fig. 4, detail of preadductorial lobe; fig. 5, ext. lat.; fig. 6, ext. vent.
Scale A (350 μm; ×27), figs. 1, 2, 5, 6; scale B (175 μm; ×55), fig. 3; scale C (125 μm; ×70), fig. 4.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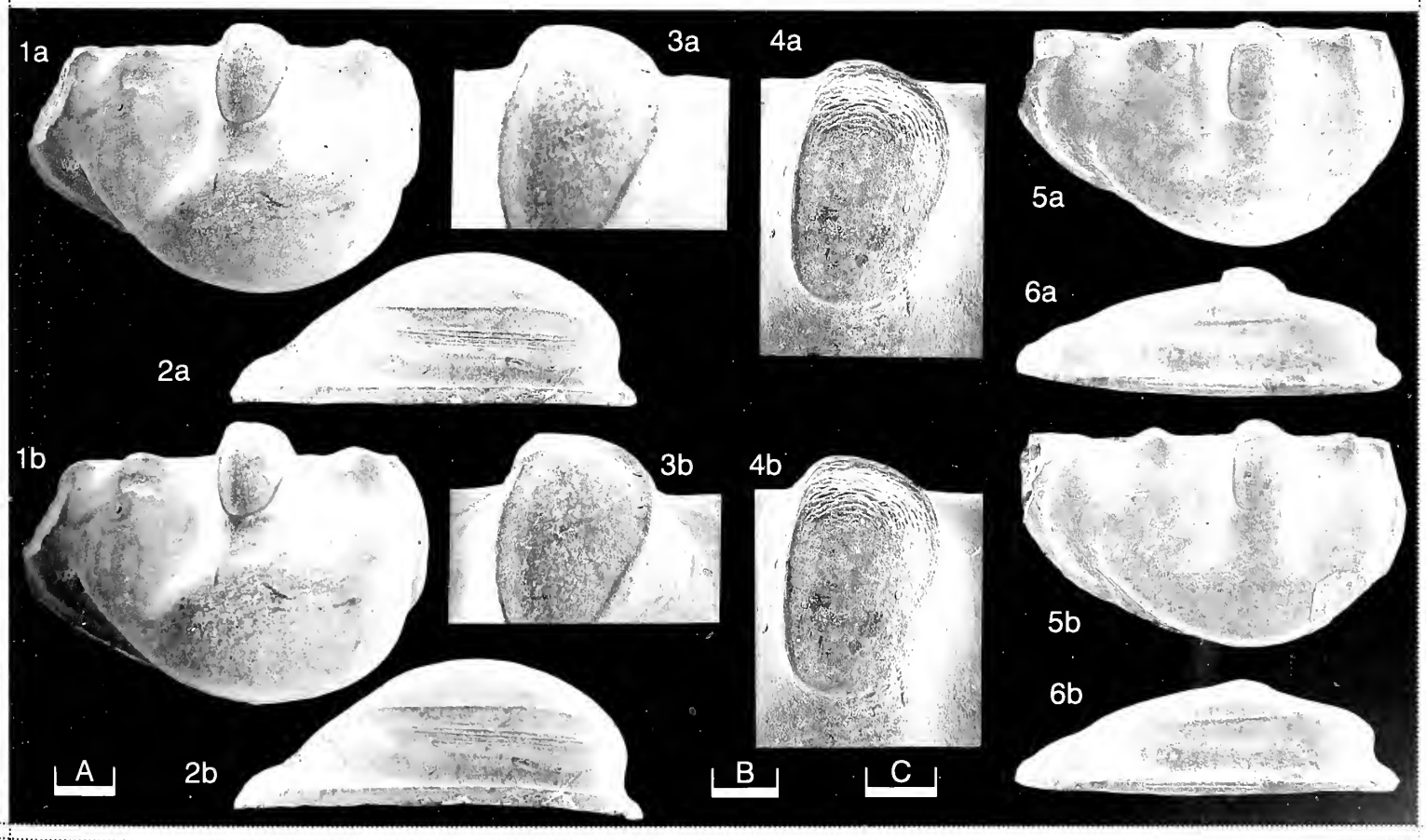
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1982 *Frostiella groenvalliana*; L. Sarv, *in*: D. Kaljo & E. Klaamann (Eds.), *Ecostratigraphy of the East Baltic Silurian*, 75, 76, 78, Tallinn (Valgus).
1982 *F. groenvalliana*; A. Abushik, *in*: *Tezisy dokladov 28th sessii Vsesojužnogo Paleontologičeskogo obščestva*, 3, 4, Taškent.
1983 *Frostiella groenvalliana* Martinsson; J.M. Berdan, *in*: R.F. Maddocks (Ed.), *Applications of Ostracoda*, 314, fig. 31, Univ. Houston.
1983 *Frostiella groenvalliana*; D. Kaljo *et al.*, *in*: *Problemy ekologii fauny i flory drevnych basseinov*, 48, Moskva.
1984 *Frostiella groenvalliana*; D. Kaljo *et al.*, *in*: *Stratigrafija i paleontologija drevnesego fanerozoja*, 101, Moskva.
1984 *Frostiella groenvalliana* Martinsson; D.J. Siveter, *Spec. Pap. Palaeont.*, **32**, 82.
?1985 *Frostiella groenvalliana s.l.*; A. Abushik *et al.*, *Lethaia*, **18**(2), 139, 142, 143.
1985 *Frostiella groenvalliana* Martinsson; W. Hansch, *Lethaia*, **18**(4), 274, 277, 278, tab. 1, fig. 1F, text-fig. 3.
1986 *Frostiella groenvalliana*; L. Gailite, *in*: D. Kaljo & E. Klaamann (Eds.), *Teorija i opyt ekostratigrafija*, 111, 114, Tallinn (Valgus).
1986 *Frostiella groenvalliana*; N.V. Sidaravičiene, *Ibid.*, 119, tab. 1.
1988 *Frostiella groenvalliana* Martinsson; D.J. Siveter, *The Lower Palaeozoic of the Northern Welsh Borderland and South Wales*, 10th Int. Symp. on Ostracoda, Aberystwyth, Field Guide No. **2**, 36, text-fig. 7, pl. 2, fig. 2.
1989 *Frostiella groenvalliana* Martinsson; D.J. Siveter, *in*: C.H. Holland & M.G. Bassett (Eds.), *A global standard for the Silurian System*, 258, 263, text-fig. 167, figs. 168 J, K, Nat. Mus. Wales, Geol. Ser. no. 9, Cardiff.
1989 *Frostiella groenvalliana* Martinsson; D.J. Siveter *et. al.*, *Silurian field excursions. A geotraverse across Wales and the Welsh Borderland*, 45, text-figs. 30, 38, 40, pl. 3, fig. 14, Nat. Mus. Wales Geol. Ser., no. 10, Cardiff.
1990 *Frostiella groenvalliana* Martinsson; T. Meidla & L. Sarv, *in*: D. Kaljo & H. Nestor (Eds.), *Field Meeting Estonia 1990. An Excursion Guidebook*, pl. 9, fig. 4, tab. 11, Tallinn.

Holotype: Palaeontological Inst. Univ. Lund, Sweden, no. **4084T**; ♀ left valve.
[Paratypes: Museum Naturkunde, Berlin, nos. **MB.O. 174–177** (Krause sample Ringshö 1), **MB.O. 178 & 179** (Krause sample Ringshö 2). Figured Martinsson 1963].

Explanation of Plate 18, 130

Fig. 1, ♂ LV, detail of uppermost part of preadductorial lobe (**LO 2184T**). Figs. 2, 3, ♀ LV (**LO 2183T**): fig. 2, detail of ornament on ventral side of crumina; fig. 3, ext. ant. Figs. 4–6, ♂ RV (**X 2603**, 2320 μm long): fig. 4, ext. lat.; fig. 5, ext. vent.; fig. 6, detail of preadductorial lobe. Fig. 7, ♂ LV, ext. lat. (**MB.O. 178**, 2065 μm long).

Scale A (150 μm; ×60), fig. 1; scale B (50 μm; ×180), fig. 2; scale C (375 μm; ×24), fig. 3; scale D (390 μm; ×23), figs. 4, 5; scale E (80 μm; ×70), fig. 6; scale F (340 μm; ×26); fig. 7.

Type locality: "Beds 3–4" *sensu* Grönwall at Ramsåsa, Scania, Sweden; lat. 55°33′N, long. 13°53′E; Přídolí Series, Silurian.

Figured specimens: Palaeontological Institute, University of Lund, Sweden, nos. **LO 2183T** (♀ LV: Pl. **18**, 126, figs. 1–3; Pl. **18**, 130, figs. 2, 3); **LO 2184T** (♂ LV: Pl. **18**, 126, figs. 4, 5, 6; Pl. **18**, 130, fig. 1). Both Moberg & Grönwall coll. (1909, pl. 6, figs. 6, 7); "Bed 4" *sensu* Grönwall, at Ramsåsa, Sweden.

Sektion Geologische Wissenschaften der E.-M.-Arndt-Universität Greifswald, Germany, nos. **SGWG 90/1** (♀ RV: Pl. **18**, 128, figs. 1–3) from erratic boulder no. 549 of Krause, Müggelheim, Berlin, approx. lat. 52°32′N, long. 13°25′E; **SGWG 90/2** (♂ RV: Pl. **18**, 128, figs. 4–6) from erratic boulder no. Bey. B20, Graal-Müritz near Rostock, Germany, lat. 54°15′N, long. 12°15′E.

Zentrales Geologisches Probenarchiv Bernau bei Berlin, Germany, no. **X 2603** (♂ RV: Pl. **18**, 130, figs. 4–6; = holotype of *F. lebiensis* Martinsson 1964, figs. 8C, D). From borehole Łeba 1, 687.5 m, Pomerania, Poland; lat. 54°45′N, long. 17°34′E.

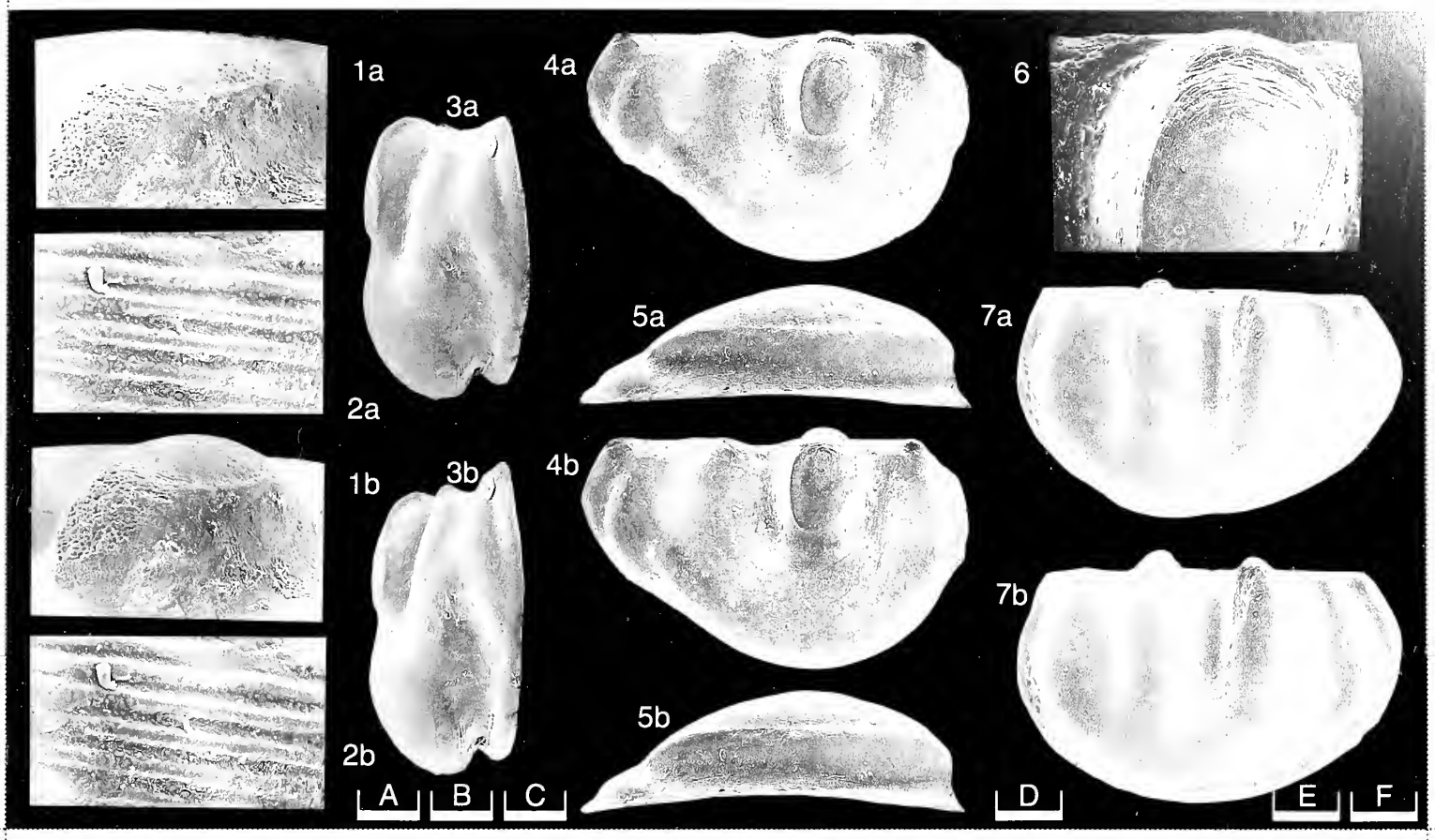
Museum für Naturkunde Berlin, Germany, no **MB.O. 178** (♂ LV: Pl. **18**, 130, fig. 7; = paratype of *F. groenvalliana* Martinsson, 1963, fig. 16B). From Krause's sample "Ringshö 2", Klinta, Scania, Sweden; lat. 55°51′N, long. 13°30′E.

British Museum (Natural History), London, nos. **OS 6618** (♀ RV: Pl. **18**, 132, fig. 4), **OS 6619** (tecnomorphic LV: Pl. **18**, 132, fig. 1), **OS 6620** (♂ LV: Pl. **18**, 132, fig. 2), **OS 6621** (♀ RV: Pl. **18**, 132, fig. 3), **OS 6622** (tecnomorphic RV: Pl. **18**, 132, fig. 6). All from Platyschisma Shale Member, Downton Castle Sandstone Formation, Downton Group, *c.* 1.5 m above the Ludlow Bone Bed on N side of Ludford Lane, Ludlow, Shropshire, Great Britain (Grid Ref.: SO 5119 7413); coll. D.J. Siveter. **OS 13922** (tecnomorphic LV: Pl. **18**, fig. 5); loose material, Downton Group, Ludford Corner excavation, Ludlow (Grid Ref.: SO 5123 7413); coll. C.G. Miller.

Explanation of Plate 18, 132

Fig. 1, tecnomorphic LV (**OS 6619**, 1780 μm long): ext. lat. Fig. 2, ♂ LV (**OS 6620**, 2025 μm long): preadductorial lobe. Fig. 3, ♀ RV (**OS 6621**, 2100 μm long): obl. vent. Fig. 4, ♀ RV (**OS 6618**, 2010 μm long): ext. lat. Fig. 5, tecnomorphic LV (**OS 13922**, 1470 μm long): dors. Fig. 6, tecnomorphic RV (**OS 6622**, 1370 μm long): ext. lat.

Scale A (400 μm; ×30), fig. 1; scale B (200 μm; ×40), fig. 2; scale C (400 μm; ×27), figs. 3, 4; scale D (300 μm; ×35), fig. 5; scale E (300 μm; ×35), fig. 6.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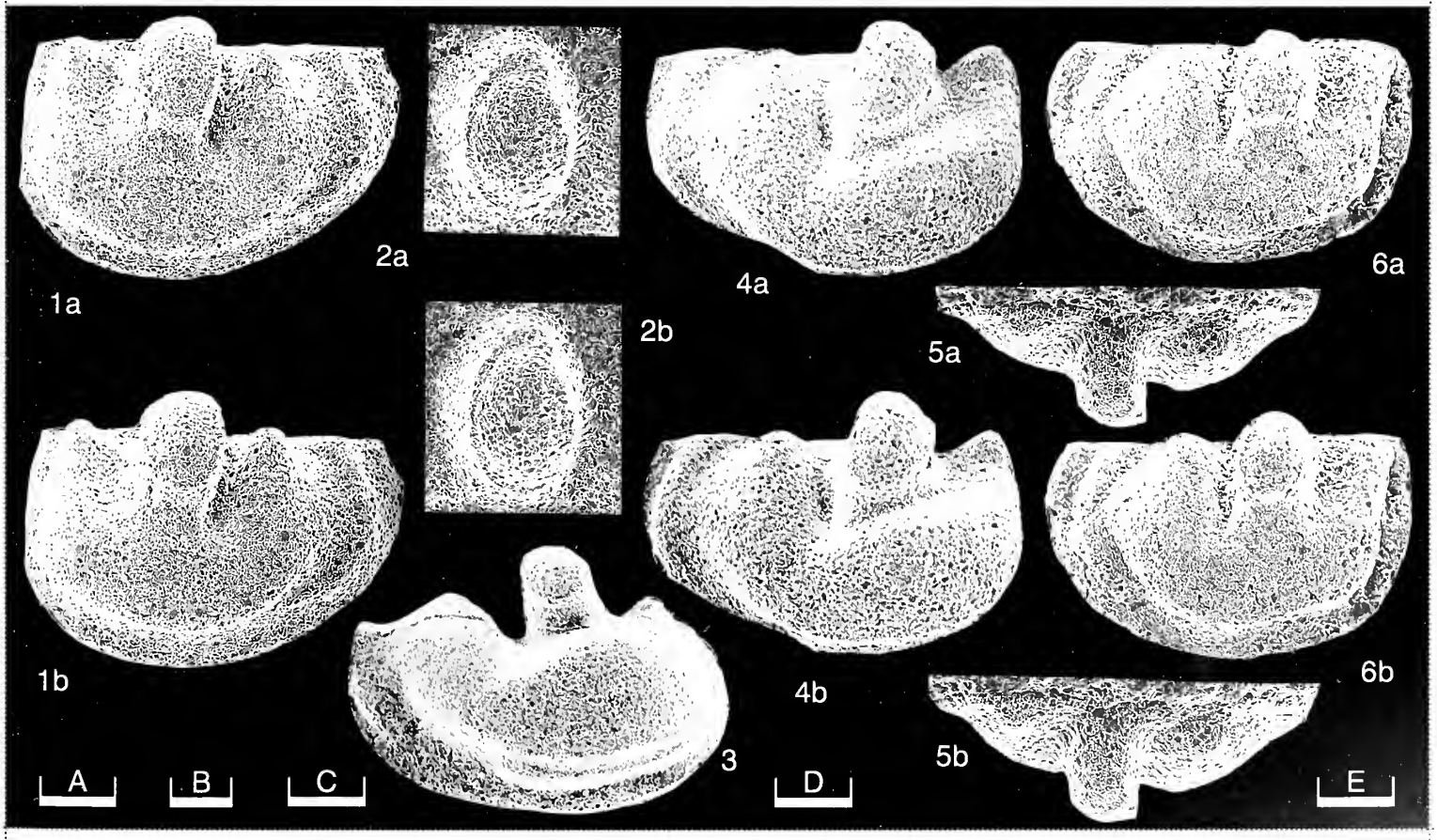
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Diagnosis: *Frostiella* species with well developed lobation and prominent cusps on the anterior lobe and the anterior lobule of the syllobium. In adults cristal loop on the preadductorial lobe complete, drawn out in sagitto-dorsal direction or nearly rounded. Valve surface smooth except for the striate cruminal field and the ornament (reticulostriation/striation/punctation) on lateral facet of the preadductorial lobe.

Remarks: *F. groenvalliana* differs from the other *Frostiella* species particularly by its more distinctly developed lobal cusps and the characteristic form of its preadductorial lobe, a feature which is also obvious in juveniles. Martinsson (1977) assumed that *F. groenvalliana* and *F. lebiensis* are synonymous. Their morphological characteristics and stratigraphical ranges are both very similar to each other. Only in the development of the preadductorial lobe is there a slight difference. In specimens hitherto described as *F. lebiensis* there is mostly a more rounded cristal loop (not pointed and somewhat distorted as in "typical" *F. groenvalliana* specimens) on the preadductorial lobe. Furthermore, it is probable that the "typical" *F. groenvalliana* is restricted to the basal Přídolí in Britain (Downton Group) and the Baltic whereas specimens with a more rounded cristal loop have a somewhat greater stratigraphical range (and may pass over continuously into the *F. cornuta* lineage). In the Baltic area such changes appear to correlate with ecological ranges from shallow water facies (*groenvalliana* specimens) to somewhat deeper water conditions (*lebiensis* specimens). This assumption is supported by the occurrence of the latter in the probably deeper, basinal (outer shelf) areas represented in, for example, the Łeba elevation (Tomczykowa & Witwicka 1974) and the Kaliningrad region Dubovskoe borehole (Kaljo & Sarv 1976). *F. groenvalliana* and *F. lebiensis* are considered as ecophenotypical intraspecific variants. Compared to the Scanian (shell) material of *F. groenvalliana*, Welsh Basin specimens (moulds) have a less ventrally drooping lateral profile to the lateroventral lobal connection (tecnomorphs) and crumina (females). This and other minor morphological differences are judged to be of infraspecific significance.

Distribution: *F. groenvalliana* is considered generally indicative of early Přídolí Series (Upper Silurian) levels in an area extending from Podolia to eastern North America (Siveter 1989, 258–263, fig. 164). However, it should be noted that *F. groenvalliana ("lebiensis")* and the key graptolite (*Monograptus parultimus* Jaeger) for the base of the Přídolí in the Czechoslovakian stratotype area do not occur coevally in any of the relevant sections. *M. parultimus* and *F. groenvalliana ("lebiensis")* occur geographically together only in the Dubovskoe borehole (Kaliningrad region; Kaljo & Sarv 1976), but at different

Distribution: (continued) horizons (Kuressare horizon and the younger Äigu Member, Kaugatuma horizon respectively). As possibly indicated by conodont correlation (Schönlaub, H.P. *in*: Kriz, J. *et al.*, *Jb. Geol. Bundesanst. Wein*, 129, 1986) the Ludlow-Přídolí boundary may be slightly above the first occurrence of *F. groenvalliana* at Ludlow, Britain (i.e. may be in the Downton Group) and parts of the Baltic.

Sweden: Grönwall's "Bed 3" and "Bed 3–4" at Klinta and Ramsåsa, Scania (Martinsson 1963, 1967); = top part of Öved-Ramsåsa Group *sensu* Jeppsson & Laufeld (*Sver. geol. Unders. Afh.*, ser. Ca, no. **58**, 1987).

Great Britain: Scout Hill Flags, Lake District (Shaw 1971). Downton Castle Sandstone Formation at Long Mountain (Shaw 1969), Shropshire (Shaw 1969, Siveter 1978, 1988, 1989, Bassett *et al.* 1982), and English W Midlands (*F.* cf. *groenvalliana*; Siveter 1989) parts of Welsh Basin. Also (?) Lakenheath borehole, E England and (?) uppermost Ludlow, Cennen Valley, Wales (see Bassett *et al.* 1982, Siveter 1989).

N America: Leighton Formation, Maine, U.S.A. (Martinsson 1967; Copeland & Berdan 1977; Berdan 1983). Possibly also occurs in Stonehouse Formation, Nova Scotia, Canada (Martinsson 1967).

East Baltic area: Ohessare 1 borehole, Venekjula and Ejgu, Isle of Saaremaa, Estonia; Kaugatuma Formation (Sarv 1968, 1970, 1971). Piltene 1, 31, 32, Kolka 4, 54, Pavilosta 51, Ventspils 3, Talšy 55 and Ezere boreholes, Latvia; Minija and basal part of Jura formations (Gailite & Ulst 1974, Gailite 1978, 1986, Sarv 1982). Stoniškiai and Vidukle boreholes, Lithuania; Minija Formation (Sarv 1982, Paskevičius 1982). Borehole 110 of Arjogal profile, Lithuania; Minija Formation (Sidaravičiene 1986). Dubovskoe borehole, Kaliningrad Region; Äigu Beds, Kaugatuma Formation (Kaljo & Sarv 1976).

Poland: Borehole Łeba 1 (Martinsson 1964). Several boreholes of the Peribaltic area (cf. Tomczykowa & Witwicka 1974, 58); lowermost Podlasian.

Erratic boulders: Beyrichienkalk type B and "Red Beyrichienkalk" *sensu* Hansch (1985); "Local" limestone boulders of the Hoburg Bank (Martinsson 1967, 1977).

?Podolia, USSR: Dnestr river, between Okopy and Belovtsy, Raskov suite, Skala Horizon (Abushik *et al.* 1985, Koren *et al. in*: Holland & Bassett (Eds.), 1989).

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Index; Geological Horizon

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Index; Geographical Location

See **1** (1) 5–22 (**1973**) for explanation of the Schedules in the Universal Decimal Classification

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